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MAMMALIAN TOXICOLOGICAL EVALUATIONS OF TNT WASTEWATERS. VOLUME --ETC(U)

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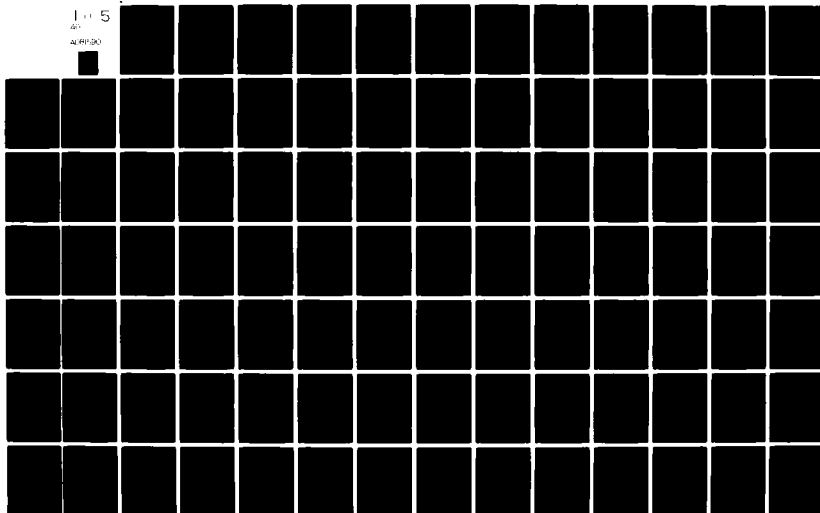
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**MAMMALIAN TOXICOLOGICAL
EVALUATION OF TNT WASTEWATERS**

**Volume III
Acute and Subacute Mammalian Toxicity
of Condensate Water**

Final Report

By

JAMES V. DILLEY, CHARLES A. TYSON,
and GORDON W. NEWELL

April 1979

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U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND
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The acute toxicity of three condensate water (CW) mixtures was determined in mammalian species. CW I, containing 17 components, was tested in acute studies only. CW II, containing 30 components, was tested in both acute and subacute studies. CW III, containing the same 30 components but in different proportions, was tested in acute studies only. CW III is the mixture intended for use in subsequent chronic studies.		

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toluene; 2-amino-4,6-dinitrotoluene; 3-amino-2,4-dinitrotoluene; 3-amino-2,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; 4-amino-3,5-dinitrotoluene; 5-amino-2,4-dinitrotoluene; 1,3-dinitrobenzene; 1,3,5-trinitrobenzene; 2,3,4-trinitrotoluene; 2,3,6-trinitrotoluene; 2,4,5-trinitrotoluene; 2,4,6-trinitrotoluene; 1,5-dimethyl-2,4-dinitrobenzene; 2-nitrotoluene; 4-nitrotoluene; 3-nitrotoluene; toluene; 3-methyl-2-nitrophenol; 5-methyl-2-nitrophenol; 2-amino-4-nitrotoluene; 2-amino-6-nitrotoluene; 3-amino-4-nitrotoluene; 4-amino-2-nitrotoluene; 3-nitrobenzonitrile; 4-nitrobenzonitrile; 2,4-dinitro-5-methylphenol; morpholine; N-morpholinoacetonitrile; N-nitrosomorpholine; subacute toxicity; dogs; rats;

20. ABSTRACT (Continued)

The acute oral LD50s, in male and female rats, respectively, were: for CW I, 264 and 251 mg/kg; for CW II, 447 and 295 mg/kg; for CW III, 401 and 290 mg/kg of body weight. All three mixtures were slightly more toxic to females than males; the difference was statistically significant in the case of the 30-component mixtures.

The acute oral LD50s for CW I were also determined in mice and were found to be 610 and 435 mg/kg of body weight in males and females, respectively. CW I produced almost negligible irritation to the eye (either washed or unwashed after instillation) and was only mildly irritating to the skin of rabbits treated with it, having a primary irritation index score of 0.18. In the maximization test for skin sensitivity, CW I produced erythema in 62.5% of the sites of guinea pigs challenged with it, which classifies it as a moderate allergen.

In vitro microbial mutagenesis assays (Ames test) were conducted to assess the mutagenic potency of CW III and its components. When added as a melt to the assay medium this mixture was mutagenic in the Salmonella typhimurium strains with or without microsomal activation. Photolysis of CW III in a uv reactor at a flow rate of 5 ml/min increased the mutagenic potential of the mixture.

Of the 34 individual components tested with Salmonella strains TA1535, 1537, 1538, 98 and 100 in the Ames test, 2,4,5-trinitrotoluene, 2,3,6-trinitrotoluene, 1,3,5-trinitrobenzene and 3,5-dinitroaniline were highly mutagenic. All six of the dinitrotoluenes, the dinitroaniline, all seven monoaminodinitrotoluenes, 1,3-dinitrobenzene, the trinitrobenzene, the four trinitrotoluenes, 1,5-dimethyl-2,4-dinitrobenzene, 5-methyl-2,4-dinitrophenol, and the two mononitrobenzonitriles tested positively in the Ames test but had much lower mutagenic potential. Of the three mononitrotoluenes, only the para-isomer was mutagenic. Three of four monoaminonitrotoluenes were mutagenic. Toluene, 4-amino-2-nitrotoluene, the two monomethylnitrophenols, and 2- and 4-nitrotoluene produced no detectable revertants in the tests. Calculations based on the weighted average contribution of the components suggest that 1,3-dinitrobenzene, 2,3,6-trinitrotoluene, 2,4-dinitrotoluene, and 1,3,5-trinitrobenzene may contribute over 60% of the mutagenic activity in CW III, while comprising less than 15% by weight.

The effects of repeated oral administration of CW II were determined in dogs, rats, and mice. Dogs (5 males and 5 females/group) were dosed daily by capsule at 0, 0.05, 0.5, and 5.0 mg CW II/kg of body weight. In dogs, treatment at the 5.0 mg/kg level produced a mild, compensatory anemia (transitory; not observed at 24 weeks), hemosiderosis of the spleen accompanied in some cases by congestion and pigmentation of the Kupffer cells and sinus macrophages in the liver. One high-dose male exhibited overt signs of neuromuscular and neurological dysfunction that were confirmed in histopathological examination of brain and CNS tissues at sacrifice. Microscopically, this dog had complete loss of the entire lenticular nucleus (putamen and globus pallidus) and substantia nigra bilaterally, astroglioses adjacent to these areas, small cavitations (surrounded by a corona of hypertrophied astrocytes) in the caudate

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19. KEY WORDS (Continued)

mice; compensatory anemia; reticulocytosis; testicular atrophy; uterine hyperplasia; hemosiderosis; neuropathy; head trauma; cardiac arrhythmia; LDH; mutagens.

20 ABSTRACT (Continued)

nuclei and demyelination in cerebrum, pyramidal tracts in the cervical cord, and other regions. The animal might have been blind, though this could not be clearly substantiated. The lesions were infarcts attributed to cessation or severe reduction of blood flow to the damaged areas. The possibility that treatment with CW II initiated the events leading to head trauma must be considered in the light of similar (though less extensive) neurological signs and pathological lesions observed in dogs treated with 2,4-dinitrotoluene, the major component in CW II, in other studies.

In addition, one other male dog had abnormalities in its ECG pattern (some arrhythmias and missed ventricular contractions) coupled with high serum LDH activity. This animal may have suffered from myocardial ischemia or damage; however, this was not confirmed microscopically. No alterations or overt signs of toxicity were observed in dogs at lower doses. The "no observable effect level" for dogs was, therefore, the 0.5 mg/kg level.

Rats and mice (20 males and 20 females/group) were fed CW II in their diets for up to 13 weeks \pm 4 weeks of recovery (an equal number of each sex were killed at each sacrifice) at 0, 0.001, 0.01 and 0.10% by weight. Numerous toxicological signs were observed in rats at the highest dose level (and to a lesser extent at the intermediate dose level) including a moderate compensatory anemia characterized by extreme reticulocytosis; moderate polychromasia; Heinz bodies and other red blood cell alterations; depressed body weights, body weight gain and food intake; rough fur; enlarged spleens and/or livers; hemosiderosis of the spleen; testicular atrophy with atrophy and aspermia of the epididymis and moderate focal interstitial cell hyperplasia; hyperplasia of the uterus and an elevation in triglyceride levels in the serum. No alterations were seen at the 0.001% level and this was designated as the "no observable effect level" in rats.

In mice, observations were similar to those in rats. Mice treated with CW II at the highest dose level, suffered from mild compensatory anemia (evident at the intermediate dose also), depressed body weight and weight gain, lower food intake and efficiency, testicular atrophy accompanied by atrophy of and cellular debris in the epididymis, enlarged spleens and livers, inflammation in the tubular reproductive tract in females, and signs of neurological dysfunction (humped backs, tilting of the head and other posture or behavioral abnormalities). In addition to signs of anemia at the 0.01% level there was also a marginal depression in body weight. Mice at the 0.001% dose level appeared to be unaffected by the treatment. Thus, 0.001% was also the "no observable effect level" in mice.

The Acceptable Daily Intake of condensate water for man is estimated to range from 0.50 to 1.16 μ g/kg based on the highest dose levels at which no effects were observed. Using this value and a bioconcentration factor for the mixture derived from octanol/water partition coefficients, an upper limit range for condensate water effluent in water bodies is 15 to 35 μ g/liter.

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EXECUTIVE SUMMARY

Under this contract from the U.S. Army Medical Research and Development Command, SRI International conducted studies in mammalian species to determine the toxicity of condensate wastewater mixtures generated during the production and purification of TNT at munitions plants. The wastewaters were representative mixtures of the condensate components derived as described in Volume I, Chemistry Studies, under this contract. Specifically, the mammalian research was to determine the acute toxicity of condensate water mixtures, the mutagenic potential of mixture components and of both photolyzed and nonphotolyzed samples of the mixture and the repeated exposure oral toxicity of the mixture in rodent and nonrodent species. This information is needed to assess the hazard associated with munitions plants effluents.

The principal objective of the initial (acute) toxicity studies (Phase I studies) was to define the properties and the mutagenic potency of the condensate water mixtures considered for toxicological testing. In these experiments, we determined the acute oral LD50 of three condensate water mixtures (differing in the number and relative concentration of components in the mixture) in rats and/or mice, the eye and skin irritation potential of one of these mixtures in rabbits, the skin sensitization by this mixture in guinea pigs, and the in vitro microbial mutagenicity of condensate water and its components with and without metabolic activation in the Ames test. The acute oral LD50s for the three mixtures ranged from 250 to 450 mg/kg of body weight, which range corresponds to that for moderately toxic materials. The mixtures were slightly more toxic to females than to males. One of the mixtures was also tested in mice and found to be less toxic (had a higher acute LD50) to mice than to rats. This difference between species was tentatively attributed to the 2,4-dinitrotoluene, the major component in the mixture, since it is known to have at least a two-fold higher acute oral LD50 in mice than rats.

In rabbits, condensate water was virtually innocuous to the eyes and only mildly irritating to the skin. It was classified as a moderate allergen by the criteria of Magnusson and Kligman in the skin sensitization test in guinea pigs.

In vitro mutagenicity experiments in Salmonella bacteria conducted on the nonphotolyzed mixture indicated that it was weakly mutagenic. Photolysis increased the mutagenicity of the mixture. Of the individual components, 2,4,5- and 2,3,6-trinitrotoluene, 1,3,5-trinitrobenzene, and 3,5-dinitroaniline had the highest mutagenic potency. The principal components (more than 40% by weight) in the mixture--1,3-dinitrobenzene and 2,4- and 2,6-dinitrotoluene--evoked much lower responses in the mutagenic assay.

The subacute toxicity of a 30-component condensate water mixture was evaluated in a 26-week study in dogs and in separate 90-day studies in rats and mice (Phase II studies). The mixture was administered to dogs at 0.05, 0.5, and 5.0 mg/kg/day by capsule, and rats and mice received 0.001, 0.01, and 0.10% of the mixture by weight in their feed. All three species exhibited a mild compensatory anemia at the high doses, characterized by decreases in red blood cell count, hemoglobin and/or hematocrit and increases in mean cell volume and by reticulocytosis, often accompanied by polychromasia, Heinz bodies and other alterations. Adaptation to the treatment was observed in dogs with time, as evidenced by the disappearance of signs of anemia by the end of the 26-week period.

All three species also exhibited symptoms that suggested treatment-related effects on the brain and central nervous system. These effects included behavioral abnormalities and changes in appearance in rodents, supported by clear pathological evidence of neurological damage to neuromuscular and sensory control centers in the brain of one of the dogs, a male, on study. The most outstanding pathological feature in microscopic examination of tissues from this dog was the complete loss of the entire lenticular nucleus, grey matter which forms the central core of the cerebral hemisphere in the brain, and of the substantia nigra bilaterally. Destruction or dysfunction of the latter is known to be responsible for loss of neuromuscular control. Extensive demyelination was observed in a number of other brain regions. The lesions in this animal's brain included infarcts that probably resulted from cessation or severe reduction of blood flow to the areas damaged by head trauma. It was hypothesized that components in the mixture may have induced pathologic changes in the nervous tissue resulting in motor dysfunction that led to trauma and in turn, more severe neural damage. 2,4-Dinitrotoluene, the major component in the mixture, has been shown in other studies to produce similar neuromuscular effects and neuropathological lesions in the dog.

All three species had alterations in the liver and in the spleen. Dogs at the high dose had hemosiderosis and congestion in the spleen. Pigmentation was observed in the Kupffer cells and sinus macrophages in the livers of several of these dogs. Rats at both the 0.01% and 0.10% dose levels had enlarged spleens and/or livers and hemosiderosis of the spleen. These effects were also seen in mice at the 0.10% dose level.

In addition, several male dogs at the high dose level had high LDH activities in their sera. Cardiac arrhythmia and missed ventricular contractions were identified in the ECG pattern of the dog with the highest LDH value, suggesting that this dog may have been experiencing myocardial ischemia or damage as a result of treatment with the condensate water mixture.

Rats and mice at the 0.10% dose level also exhibited a number of other alterations that were considered to be treatment-related. Body weights and weight gains and food intake were suppressed. The males

had testicular atrophy with atrophy, aspermia, or cellular debris in the epididymis and moderate focal interstitial cell hyperplasia. Females had hyperplasia of the uterus (rats) and inflammation in the tubular reproductive tract (mice). Clinical chemistry determinations (done only on rats for lack of sufficient sera from mice for analysis) revealed an elevation in triglyceride levels in some high dose animals that may have been related to the treatment.

Several groups of rats and mice were set aside for a 4-week recovery period following either 4 or 13 weeks of treatment with the condensate water mixture. Rats and mice at the 0.01% dose level, a level of condensate water roughly comparable to that of dogs treated at 5.0 mg/kg/day, had normal blood parameters when removed from treatment for 4 weeks. At the high dose level, this length of time was insufficient to reverse several of the effects produced by the mixture. Even after the recovery period, there were lingering signs of anemia, and hemosiderosis of the spleen and testicular atrophy were seen under the electron microscope. Repeated exposure to such high doses clearly inhibited recovery from the effects of the treatment.

On the basis of the experiments conducted here, "no-effect" levels for the condensate water mixture used in the Phase II testing were found to be 0.50 mg/kg/day for dogs and 0.001% of the mixture daily in the diet for rats and mice. An Acceptable Daily Intake range of condensate water for man is estimated from the highest dose levels in these studies at which no effects were observed to be 0.50 to 1.16 $\mu\text{g}/\text{kg}$. Using these values and a bioconcentration factor for the mixture derived from octanol/water partition coefficients, the recommended upper limit range for condensate water effluent in water bodies is 15-35 $\mu\text{g}/\text{liter}$.

FOREWORD

All animal facilities used in conducting the research described in this report have been accredited by the American Association for the Accreditation of Laboratory Animal Care. Maintenance and research practices in the use of laboratory animals were conducted according to the principles and standards enumerated in the Guide for Laboratory Animal Facilities and Care (1972) of the National Academy of Sciences/National Research Council, and the revised 1978 Guide for the Care and Use of Laboratory Animals, USHEW PHS, DHEW Publication No. (NIH) 78-23, and the Animal Welfare Act of 1966 (Public Law 89-544), as amended by the Animal Welfare Act of 1977 (Public Law 91-579). Our facilities are inspected and licensed by USDA, APIS (License Numbers 93-B-19 and 93-26).

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The analytical work was directed by Dr. Ronald J. Spanggord, Manager of the Bio-Analytical Chemistry Program. Dr. Vincent F. Simmon, Manager of the Microbial Genetics Program, was responsible for the in vitro mutagenesis assays. Dr. Ann D. Mitchell, Manager of the Biochemical Cytogenetics Program, was in charge of the cytogenetics studies. Mr. Douglas E. Robinson performed the unscheduled DNA synthesis assays.

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Dr. Harold S. Javitz, Statistician, devised the statistical program for analyzing data and supervised the computer work. Mr. Lawrence J. Walter did the programming and data tabulation, assisted by Sandra Green. Drs. Dilley, Tyson, and Javitz were responsible for analysis of the experimental data.

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PART 1 - ACUTE STUDIES ON CONDENSATE WATER (PHASE I)

INTRODUCTION

In Phase I, we conducted experiments to determine the acute oral LD50s in rats of three condensate water mixtures--one containing 17 components and two containing 30 components in different proportions. In addition, the acute oral LD50s in mice, the skin and eye irritancy in rabbits, and the skin sensitization in guinea pigs were determined for the 17-component mixture. We determined the mutagenicity of condensate water components and mixtures in Salmonella and assessed the effect of irradiation of a representative condensate water mixture on its mutagenicity.

PROCEDURES

Animals and Housing

Male and female immature Sprague-Dawley-derived rats (130 to 180 g) and Swiss-Webster mice (15 to 20 g) were obtained from Simonsen Laboratories, Gilroy, California. Albino guinea pigs of the Hartley strain were purchased from Hilltop Laboratories, Los Angeles, California. The supplier of the New Zealand White rabbits was L.I.T. Rabbitry, Aptos, California.

All rodents were observed for a minimum of 1 week after their arrival to ensure that only healthy animals were used. They were kept in air-conditioned rooms ($75 \pm 5^\circ$ F) with a relative humidity of $50 \pm 10\%$ and photoperiod of 12 hours. The rats were marked with felt pen stripes on their tails for individual identification and housed five per cage in plastic cages with wire tops and Absorb-dri hardwood bedding. The mice were housed in smaller plastic cages with wire tops and Absorb-dri bedding and were identified by tail markings. The rodents were fed ground Purina Laboratory Chow. They were given deionized tap water ad libitum through an automatic water system using lixit valves. Because these were short-term experiments, neither feed nor water was analyzed for pesticide contaminants or chlorinated hydrocarbons.

Rabbits were housed in all-wire cages with wire bottoms and alfalfa pellets in pans below and were identified by cage cards. They were fed Purina Rabbit Chow and given tap water ad libitum as described above. Their eyes were inspected carefully for clarity before the rabbits were used. Guinea pigs were housed one per cage in clear plastic cages and identified by cage cards; they were fed Purina Guinea Pig Chow and given water ad libitum in water bottles.

Materials

The components used in the condensate wastewater mixtures for toxicological testing are listed together with their percentages in the mixtures in Table 1. The commercial sources for the chemicals and the methods used to synthesize those not available commercially are described in Volume 1, Chemistry Studies.¹

The methods used are briefly as follows:

- (1) 2,3-Dinitrotoluene was prepared in a 4-step process by reacting, in turn, acetic anhydride and o-toluidine to form N-acetyl-2-amino-3-nitrotoluene, nitration in the 3-carbon position with HNO_3 , hydrolysis of the N-acetyl bond with strong acid and oxidation of the amino group to nitro with H_2O_2 .
- (2) 3-Amino-2,6-dinitrotoluene was made from reacting hydroxylamine hydrochloride and 2,6-dinitrotoluene in an alcoholic-KOH solution.
- (3) 3-Amino-2,4-dinitrotoluene was prepared by nitration of 2,3-dinitrotoluene with HNO_3 followed by addition of aqueous NH_3 to a solution of the recrystallized product in absolute ethanol.
- (4) 2,5-Dinitrotoluene was prepared from 2-amino-5-nitrotoluene by oxidation with 30% H_2O_2 in a solution of glacial acetic acid and sulfuric acid.
- (5) 4-Amino-3,5-dinitrotoluene was made by acetylating p-toluidine with acetic anhydride, nitrating the product in the 3- and 5-positions with HNO_3 in strong H_2SO_4 and regenerating an amino group in the 4-position by hydrolysis with strong HCl .
- (6) 3,5-Dinitrotoluene was prepared exothermically by addition of NaNO_2 to the 4-amino-3,5-dinitrotoluene in ethanolic- H_2SO_4 .
- (7) 1,5-Dimethyl-2,4-dinitrobenzene was produced from m-xylene by nitration with 90% HNO_3 in an exothermic reaction at 90° .
- (8) 2-Amino-3,6-dinitrotoluene was made by acetylating 2-amino-6-nitrotoluene with acetic anhydride in acetic acid followed by mononitration of the ring with HNO_3 in H_2SO_4 and precipitation of the desired isomer from mixture in 50% H_2SO_4 .

Table 1
COMPOSITION OF CONDENSATE WATER MIXTURES
FOR TOXICOLOGICAL TESTING

Compound	Chemical Abstract Numbers	Relative Percent		
		Phase I Tests	Phase II Tests	Phase III Tests
Toluene	108-88-3	0.549	0.60	0.590
2-Nitrotoluene (NT)	88-72-2	0.063	0.09	0.089
4-Nitrotoluene	99-99-0	0.294	0.30	0.295
3-Nitrobenzonitrile	619-24-9		0.01	0.035
4-Nitrobenzonitrile	619-72-7		0.01	0.027
2-Amino-4-NT	99-55-8		0.03	0.097
2-Amino-6-NT	603-83-8		0.10	0.030
3-Amino-4-NT	--*		0.10	0.080
3-Methyl-2-nitrophenol	4920-77-8	0.032	0.03	0.035
5-Methyl-2-nitrophenol	700-38-9		0.06	0.094
1,3-Dinitrobenzene (DNB)	99-65-0	13.88	12.01	11.803
2,3-Dinitrotoluene (DNT)	602-01-7	1.55	1.26	1.180
2,4-DNT	121-14-2	51.85	44.14	43.377
2,5-DNT	619-15-8	1.25	1.20	1.180
2,6-DNT	606-20-2	22.50	21.92	21.541
3,4-DNT	610-39-9	1.55	1.50	1.475
3,5-DNT	618-85-9	1.54	1.56	1.534
3,5-Dinitroaniline	618-87-1		0.01	0.171
1,5-Dimethyl-2,4-DNB	616-72-8	1.53	1.29	1.151
2-Amino-3,6-DNT	56207-39-7		0.09	0.089
2-Amino-4,6-DNT	35572-78-2	0.05	0.06	0.059
3-Amino-2,4-DNT	--*		4.50	4.426
3-Amino-2,6-DNT	--*		3.60	3.541
4-Amino-2,6-DNT	1946-51-0	1.87	1.80	1.770
4-Amino-3,5-DNT	6393-42-6	0.62	0.60	0.590
5-Amino-2,4-DNT	--*	2.51	2.10	2.066
5-Methyl-2,4-dinitrophenol	616-73-9		0.14	0.251
1,3,5-Trinitrobenzene (TNB)	99-35-4		0.02	0.451
2,3,6-Trinitrotoluene (TNT)	18292-97-2		0.06	0.791
2,4,6-TNT	118-96-7	1.53	1.20	1.180
Total (analytical)		103.17	100.39	100.00

* Not listed.

- (9) 5-Amino-2,4-dinitrotoluene was derived from reacting 3,4-dinitrotoluene with HNO_3 in H_2SO_4 and ammoniation of the product with concentrated NH_4OH .
- (10) 1,3,5-Trinitrobenzene was prepared from 2,4,6-trinitrotoluene by oxidation of the methyl to a carboxyl group with sodium dichromate and cleavage of the radical with strong NaOH forming CO_2 and the intended product.
- (11) 2,3,6-Trinitrotoluene required several steps in the reaction sequence. Starting with acetylation of 2-methyl-3-nitroaniline with acetic anhydride, a second nitro group was inserted into the ring with HNO_3 in H_2SO_4 . The 2,3,6-derivative was formed by oxidation of the mixture with H_2O_2 , concentration by rotary evaporation, addition of CH_2Cl_2 and washing with 5% NaHCO_3 and water to remove the more water-soluble isomers.
- (12) 3-Amino-4-nitrotoluene was made by heating 3,4-dinitrotoluene and NH_4OH in CH_3OH for 6 hours at 150° .

Test Methods

Determination of Acute Oral LD50s

The acute oral LD50s for the condensate water mixtures were determined in young-adult rats and mice. Animals were fasted overnight before they were dosed. Four or five dose levels were used (10 males and 10 females per dose).

The test material was administered in corn oil via stainless-steel oral dosing needles. The condensate mixture was weighed and then placed in graduated cylinders, to which sufficient corn oil was added to make the desired concentration. The mixture was stirred briefly and transferred to beakers. A magnetic stirring rod was placed in each beaker. Each beaker was wrapped in aluminum foil and then wrapped in parafilm to minimize evaporation. The material was stirred until dissolved or suspended uniformly in the corn oil (at least 24 hours). Suspensions were checked for lumps and then returned to the stirrer, where they remained throughout dosing. Controls received corn oil alone.

The animals were weighed before dosing, and each animal was dosed with a volume based on 1 ml/100 g of its body weight. After dosing, the animals were returned to their cages and provided with food and water.

The animals were observed for toxic signs and mortality 2 or 3 times a day for the first day, twice a day for 7 days, and then once a day until 14 days had elapsed. The time of death was recorded, as were toxic signs as soon as they were observed. (All observations were number-coded according to coded observation sheets.) Animals that died were examined for any gross pathological changes. Body weights were recorded on Days 7 and 14 for survivors.

The LD50s and 95% confidence intervals for the test mixtures were calculated by a computer program based on the maximum likelihood method of Finney² (see Appendix A).

Determination of Eye Irritation in Rabbits

A modification of the Draize method³ was used for determining eye irritation in rabbits. Nine albino rabbits were used. Their eyes were examined to ensure that they had no defects or signs of irritation prior to testing. The 17-component condensate water mixture (0.10 ml) was applied inside the lower lid of one eye of each animal; the eyelids were gently held together for 2 seconds, and then the animal was released. In three animals, the test substance was not washed from the eyes; in three others, the eyes were washed after 30 seconds; the eyes of the remaining three were washed after 5 minutes. The eyes were scored for irritation and other ocular lesions after 1, 24, 48, and 72 hours, or until they were clear, and again after 4 and 7 days (or longer if necessary to assess reversibility). The scoring method used was as follows.

EYE IRRITATION TEST: SCALE FOR SCORING OCULAR LESIONS³

(1) Cornea

(A) Opacity-degree of density (area most dense taken for reading)

No opacity	0
Scattered or diffuse area, details of iris clearly visible	1
Easily discernible translucent areas, details of iris slightly obscured	2
Opalescent areas, no details of iris visible, size of pupils barely discernible	3
Opaque, iris invisible	4

(B) Area of cornea involved

One quarter (or less) but not zero	1
Greater than one quarter, but less than half	2
Greater than half, but less than three quarters	3
Greater than three quarters, up to whole area	4

A x B x 5

Total maximum = 80

(2) Iris

(A) Values

Normal	0
Folds above normal, congestion, swelling, circumcorneal injection (any or all of these or combination of any thereof), iris still reacting to light (sluggish reaction is positive)	1
No reaction to light, hemorrhage, gross destruction (any or all of these)	2

A x 5

Total maximum = 10

(3) Conjunctivae

(A) Redness (refers to palpebral and bulbar
conjunctivae excluding cornea and iris)

Vessels normal	0
Vessels definitely injected above normal	1
More diffuse, deeper crimson red, individual vessels not easily discernible	2
Diffuse beefy red	3

(B) Chemosis

No swelling	0
Any swelling above normal (includes nictitating membrane)	1
Obvious swelling with partial eversion of lids	2
Swelling with lids about half closed	3
Swelling with lids about half closed to completely closed	4

(C) Discharge

No discharge	0
Any amount different from normal (does not include small amounts observed in inner canthus of normal animals)	1
Discharge with moistening of the lids and hairs just adjacent to lids	2
Discharge with moistening of the lids and hairs, and considerable area around the eye	3

(A + B + C) x 2

Total maximum = 20

Determination of Skin Irritation in Rabbits

The 17-component condensate mixture was evaluated as a skin irritant by occluded patch testing on rabbits and assessed by the Draize method for identifying primary skin irritants.⁴ Five healthy rabbits were used for the test.

Twenty-four hours before exposure, a large area on each rabbit's back was shaved. The shaved area was divided into quadrants, providing four exposure sites per rabbit. Just before the test mixture was applied, the upper left and lower right quadrants were lightly abraded in a tic-tac-toe pattern with a wire abrader that barely penetrated the stratum corneum. The upper right and lower left quadrants were left intact. The condensate mixture (0.5 ml) was placed over a 2-sq-inch area in each quadrant and immediately covered with gauze sponges (Johnson and Johnson Co.). Rolled gauze was wrapped around the rabbit's trunk, covering the gauze sponges. Rubberized cloth was then wrapped around the gauze and secured in place with waterproof tape. The patches were removed after 24 hours, and the reactions were examined for edema and erythema immediately and 48 hours later--i.e., 24 and 72 hours after the application of the condensate mixture.

The sites were scored according to the following scale.

SKIN IRRITATION TEST: EVALUATION OF SKIN REACTIONS⁴

(1) Erythema and Eschar Formation	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	<u>4</u>
Total possible erythema score	4
(2) Edema Formation	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well defined by definite raising)	2
Moderate edema (raised approximately 1 mm)	3
Severe edema (raised more than 1 mm and extending beyond area of exposure)	<u>4</u>
Total possible edema score	4

A primary irritation index was calculated based on the combined readings from all test sites at 24 and 72 hours, divided by 4. Compounds producing combined averages (primary irritation indices) of 2 or less are considered as only mildly irritating, those with indices of from 2 to 5 are moderate irritants, and those with scores above 6 are considered severe irritants.

Determination of Sensitization in Guinea Pigs

Guinea pigs that weighed 300 to 500 g were treated with condensate mix according to the method of Magnusson and Kligman.⁵ The maximization test of Magnusson and Kligman entails induction in two stages:

(1) intradermal injection of the test substance in Freund's Complete Adjuvant at two sites; the Adjuvant alone at two other sites; and the test material dissolved at the same concentration in corn oil at the two remaining sites on the backs of 10 guinea pigs; and (2) after 1 week, topical application of the test agent in petrolatum over the injection sites (2 x 4 cm each site) under an occluded dressing for 48 hours. The animals are challenged topically with a 25% suspension or solution in petrolatum or with the highest possible concentration of the test substance in petrolatum 2 weeks after topical induction. The sites are evaluated for erythema and edema 24 hours after removal of the challenge patches and again 24 hours later. The scoring system and allergenicity ratings based on the percentage of animals sensitized are as follows:

MAXIMIZATION GRADING FOR CONTACT ALLERGENICITY⁵

<u>Sensitization Rate (%)</u>	<u>Grade</u>	<u>Classification</u>
0-8	I	Weak
9-28	II	Mild
29-64	III	Moderate
65-80	IV	Strong
81-100	V	Extreme

In Vitro Mutagenicity Testing

Thirty-four compounds identified in condensate water were screened for mutagenic activity in the Ames Salmonella/microsome assay. Each assay was performed in the presence and in the absence of a rat liver homogenate metabolic activation system and at least twice on separate days.

Salmonella Typhimurium Strains TA1535, TA1537, TA1538, TA98, and TA100

The Salmonella typhimurium strains used at SRI are all histidine auxotrophs by virtue of mutations in the histidine operon. When these histidine-dependent cells are grown on a minimal media petri plate containing a trace of histidine, only those cells that revert to histidine independent (his⁺) are able to form colonies. The small

amount of histidine allows all the plated bacteria to undergo a few divisions; in many cases, this growth is essential for mutagenesis to occur. The his⁺ revertants are easily scored as colonies against the slight background growth. The spontaneous mutation frequency of each strain is relatively constant, but when a mutagen is added to the agar, the mutation frequency is increased 2- to 100-fold.

We obtained our S. typhimurium strains from Dr. Bruce Ames of the University of California at Berkeley.⁶⁻¹¹ In addition to having mutations in the histidine operon, all the indicator strains have a mutation (rfa⁻) that leads to a defective lipopolysaccharide coat; they also have a deletion that covers genes involved in the synthesis of vitamin biotin (bio⁻) and in the repair of ultraviolet (uv)-induced DNA damage (uvrB⁻). The rfa⁻ mutation makes the strains more permeable to many large aromatic molecules, thereby increasing the mutagenic effect of these molecules. The uvrB⁻ mutation decreases repair of some types of chemically or physically damaged DNA and thereby enhances the strains' sensitivity to some mutagenic agents. Strain TA1535 is reverted to his⁺ by many mutagens that cause base-pair substitutions. TA100 is derived from TA1535 by the introduction of the resistance transfer factor plasmid pKM101. This plasmid is believed to cause an increase in error-prone DNA repair that leads to many more mutations for a given dose of most mutagens.¹⁰ In addition, plasmid pKM101 confers resistance to the antibiotic ampicillin, which is a convenient marker to detect the presence of the plasmid in the cells. We have shown that TA100 can detect mutagens, such as benzyl chloride and 2-(2-furyl)-3-(5-nitro-2-furyl)-acrylamide (AF2), that are not detected by TA1535. The presence of this plasmid also makes strain TA100 sensitive to some frameshift mutagens [e.g., ICR-101, benzo(a)pyrene, aflatoxin B₁, and 7,12-dimethyl-benz(a)anthracene]. Strains TA1537 and TA1538 are reverted by many frameshift mutagens. TA1537 is more sensitive than TA1538 to mutation by some acridines and benzanthraces, but the difference is quantitative rather than qualitative. Strain TA98 is derived from TA1538 by the addition of the plasmid pKM101, which makes it more sensitive to some mutagenic agents.

All the indicator strains are routinely checked for their genotypic characteristics (his, rfa, uvrB, bio) and for the presence of the plasmid. Cultures are then stored in 10% sterile glycerol at -80° C. For each experiment, an inoculum from the stock cultures is grown overnight at 37° C in nutrient broth (Oxoid, CM67). After stationary overnight growth, the cultures are shaken for 3 to 4 hours to ensure optimal growth.

Aroclor 1254-Stimulated Metabolic Activation System

Some carcinogenic chemicals, either of the aromatic amino type or polycyclic hydrocarbon type, are inactive unless they are metabolized to active forms. In animals and man, an enzyme system in the liver

or other organs (e.g., lung or kidney) is capable of metabolizing a large number of these chemicals to carcinogens.^{9,11,13} Some of these intermediate metabolites are very potent mutagens in the S. typhimurium test. Ames has described the liver metabolic activation system that we use.¹¹ In brief, adult male rats (250 to 300 g) are given a single 500-mg/kg intraperitoneal injection of a polychlorinated biphenyl, Aroclor 1254. This treatment enhances the synthesis of enzymes involved in the metabolic conversion of chemicals. Four days after the injection, the animals' food is removed but drinking water is provided ad libitum. On the fifth day, the rats are killed and the liver homogenate is prepared as follows:

The livers are removed aseptically and placed in a preweighed sterile glass beaker. The organ weight is determined, and all subsequent operations are conducted in an ice bath. The livers are washed in an equal volume of cold, sterile 0.15 M KCl (1 ml/g of wet organ), minced with sterile surgical scissors in three volumes of 0.15 M KCl, and homogenized with a Potter-Elvehjem apparatus. The homogenate is centrifuged for 10 minutes at 9000 x g, and the supernatant, referred to as the S-9 fraction, is quickly frozen in dry ice and stored at -80° C.

The metabolic activation mixture for each supernatant consists of, for 10 ml total:

- 1.00 ml of S-9 fraction
- 0.20 ml of MgCl₂ (0.4 M) and KCl (1.65 M)
- 0.05 ml of glucose-6-phosphate (1 M)
- 0.40 ml of NADP (0.1 M)
- 5.00 ml of sodium phosphate buffer (0.2 M, pH 7.4)
- 3.35 ml of H₂O.

Assays in Agar

To a sterile 13 x 100 mm test tube placed in a 43° C heating block, we add in the following order:

- (1) 2.00 ml of 0.6% agar*
- (2) 0.05 ml of indicator organisms
- (3) 0.50 ml of metabolic activation mixture (optional)
- (4) 0.05 ml of a solution of the test chemical.

For negative controls, we use steps (1), (2), and (3) (optional) and 0.05 ml of the solvent used for the test chemical. Because the majority of organic compounds are not sufficiently water-soluble, particularly at the higher concentrations, we routinely use dimethyl

* 0.6% agar contains 0.05 mM histidine and 0.05 mM biotin.

sulfoxide (DMSO). Other solvents that are occasionally used are water, ethanol, and benzene. For positive controls, we test each culture by specific mutagens known to revert each strain, using steps (1), (2), (3) (optional), and (4).

This mixture is stirred gently and then poured onto minimal agar plates.* After the top agar has set, the plates are incubated at 37° C for 2 days. The number of his⁺ revertant colonies is counted and recorded.

Calculation of Mutagenic Potency Contribution to the Mixture

The contribution of each component to the mutagenic potential of the mixture was estimated as follows: The mutagenic potency (number of revertants minus control ÷ dose in µg) was calculated at each concentration of test compound for each strain and the highest value was used for estimating its contribution to the mixture. (4-Nitrobenzonitrile is an exception because of its low potency and consequently the low sensitivity in measuring its effect, the largest difference between control and treated revertants was used rather than the highest calculated mutagenic potency.) The contribution of each compound to the condensate water mixture was determined by multiplying mutagenic potency by the average concentration of the component in the mixture.

* Minimal agar plates consist of, per liter, 15 g of agar, 50 g of glucose, 0.2 g of $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 2 g of citric acid monohydrate, 10 g of K_2HPO_4 , and 3.5 g of $\text{NaNH}_4\text{PO}_4 \cdot 4\text{H}_2\text{O}$.

RESULTS

Acute Oral LD50s

Table 2 presents the acute oral LD50s, 95% confidence limits, and slopes of the regression lines in male and female rats for the three condensate water mixtures used in the toxicological testing.

Table 2

ACUTE ORAL TOXICITY OF CONDENSATE WATER MIXTURES TO MALE AND FEMALE RATS

Condensate Water Mixture	Sex	LD50 (mg/kg)	95% Confidence Limits	Slope
30-Component for Phase II testing	Male	447	418-477	7.02
	Female	295	272-320	11.4
30-Component for Phase III testing	Male	401	371-428	6.62
	Female	290	230-365	12.9
17-Component	Male	264	241-290	7.53
	Female	251	228-274	7.75

The 17-component mixture was more toxic to male rats than either of the other two; this was probably true for females also, but the confidence intervals overlap in this case. The Phase II mixture was somewhat less toxic to male rats than the Phase III mixture, but not markedly so, since there was overlap in the 95% confidence intervals. For female rats, there was no discernible difference in toxicity between the two 30-component mixtures. Both 30-component mixtures were more toxic to females than to males. The LD50 values of the 17-component mixture for males and females were not significantly different.

The acute oral LD50s and 95% confidence intervals of the 17-component mixture were also determined in mice. These values were 610 (462-865) and 435 (319-538) mg/kg for males and females, respectively, or slightly higher than the corresponding values in the rat for this mixture (Table 2).

The rats and mice treated with the condensate water mixtures became inactive and appeared to be comatose from 3 to 10 hours after dosing. This condition lasted for 24 to 72 hours. The rats generally

Eye Irritancy in Rabbits

The mixture was essentially nonirritating to eyes.

Table 4 presents the results of the skin irritancy study with the 17-component condensate mixture in rabbits. The primary skin irritation score for the test mixture was calculated to be 0.175.

Table 5 gives the individual scores for the guinea pigs treated with the 17-component condensate water mixture. No severe reactions (scores greater than 2) were observed with the test mixture. What redness was observed disappeared after 48 hours in all but one animal. Two guinea pigs died during the induction period; their tissues could not be saved for pathology because they were autolyzed. Considering the mildness of the response to treatment in the surviving animals, we ascribed the death to stress (which is not uncommon among guinea pigs in this test) rather than to treatment with the mixture.

The percentage of guinea pigs responding to the treatment was 62.5%. By the criteria of Magnusson and Kligman⁵ the condensate water mixture would be classified as a moderate allergen.

Table 6 presents a summary of the mutagenic activity of condensate water components. The table gives the average concentration of each compound in the 30-component mixture proposed for Phase III testing,

Table 3

EYE IRRITATION OF CONDENSATE WATER IN RABBITS

<u>Washing Time*</u>	<u>Total Scores† After:</u>	
	<u>1 Hour</u>	<u>24 Hours‡</u>
No wash		
Cornea	0	0
Iris	0	0
Conjunctiva	<u>12</u>	<u>0</u>
Total	12	0
Wash 30 sec after treatment		
Cornea	0	0
Iris	0	0
Conjunctiva	<u>10</u>	<u>0</u>
Total	10	0
Wash 5 min after treatment		
Cornea	0	0
Iris	0	0
Conjunctiva	<u>10</u>	<u>0</u>
Total	10	0

* Three rabbits per group.

† Maximum possible score for three eyes by Draize method³ is 330.

‡ Experiment terminated after 24 hours.

Table 4
SKIN IRRITATION OF CONDENSATE WATER IN RABBITS

	<u>24-Hour Readings* of Erythema†</u>			
<u>Animal No.</u>	<u>Intact</u>		<u>Abraded</u>	
1	1	0	0	0
2	0	0	0	1
3	1	1	0	1
4	0	0	0	0
5	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>
Total mean score	0.3		0.4	
Combined score	0.7			

Primary irritation score = $0.7 \div 4\ddagger = 0.175$

* This corresponds to 24 hours after application of the condensate mixture. The 72-hour readings were zero at each site.

† No edema was observed at any site.

‡ Factor adjusts for zero scores for edema at 24 and 72 hours and zero scores for erythema at 72 hours at all sites.

Table 5

SENSITIZATION OF GUINEA PIGS TO CONDENSATE WATER*

<u>Animal No.</u>	<u>Scores at 24 Hours After Challenge</u>		<u>Scores for Erythema at 48 Hours After Challenge</u>
	<u>Erythema</u>	<u>Edema</u>	
11	0	0	0
12	1	0	0
13	0	0	0
14	0	0	0
15	1	0	0
16	1	0	0
17	2	0	1
18	Died†		
19	Died†		
20	<u>1</u>	0	0

Percent positive 62.5

* Concentration of 17-component condensate water mixture in Freund's Complete Adjuvant and in corn oil for intradermal injection was 5%. Topical concentration of synthetic condensate mixture in petrolatum for induction and for challenge was 25%.

† Nos. 18 and 19 died during induction.

Table 6

SUMMARY OF MUTAGENIC ACTIVITY OF NITROTOLUENE ANALOGUES

Compound	Average Concentration ⁺ (ppm)	Mutagenic Potency ⁺⁺ (Revertants/μg tested)	Micrograms Tested	Salmonella typhimurium strain	Metabolic Activation	Contribution (Average Concentration x Mutagenic Potency)
2,4-Dinitrotoluene	9.400	0.692	500	TA100	-	0.277
3,5-Dinitrotoluene	14.700	0.285	750	TA100	-	4.190
2,6-Dinitrotoluene	0.400	1.292	250	TA100	-	0.517
2,5-Dinitrotoluene	7.300	0.252	500	TA100	-	1.340
3,6-Dinitrotoluene	0.500	0.277	300	TA100	-	0.139
3,4-Dinitrotoluene	0.520	1.040	700	TA100	-	0.541
3,5-dinitroaniline	0.053	31.633	30	TA98	-	1.335
2-Amino-3,5-dinitrotoluene	0.036	3.353	300	TA100	-	0.101
3-Amino-4,6-dinitrotoluene	0.020	1.330	500	TA100	-	0.027
3-Amino-2,4-dinitrotoluene	1.500	0.327	750	TA100	+	0.490
3-Amino-2,6-dinitrotoluene	1.200	1.063	300	TA100	-	1.276
4-Amino-2,6-dinitrotoluene	0.600	0.584	500	TA100	+	0.350
4-Amino-3,5-dinitrotoluene	0.250	0.960	50	TA93	-	0.192
5-Amino-2,4-dinitrotoluene	0.730	2.870	100	TA93	-	2.009
1,3-Dinitrobenzene	4.000	1.820	500	TA93	-	7.280
1,3,5-Trinitrobenzene	3.153	24.700	30	TA100	-	3.779
2,3,4-Trinitrotoluene	0.263	5.267	150	TA100	-	4.157
2,3,5-Trinitrotoluene	0.400	15.513	30	TA98	-	-
2,4,6-Trinitrotoluene	0.390	57.650	20	TA100	-	-
1,5-Dimethyl-2,4-dinitrobenzene	0.390	6.310	100	TA100	-	2.524
2-Nitrotoluene	3.000	0.133	1000	TA100	-	0.071
4-Nitrotoluene	0.100	*	2000	TA100	+	0.006
3-Nitrotoluene	0.290	*	-	-	-	-
2-Nitro-1-2-nitrophenol	0.012	*	-	-	-	-
3-Ethyl-2-nitrophenol	0.032	*	-	-	-	-
2-Amino-4-nitrotoluene	0.033	0.173	1000	TA100	+	0.006
2-Amino-6-nitrotoluene	0.010	0.091	300	TA100	+	0.001
3-Amino-4-nitrotoluene	0.027	0.761	1500	TA98	-	0.021
3-Amino-2-nitrotoluene	0.013	*	-	-	-	-
3-nitrobenzonitrile	0.009	0.430	100	TA100	-	0.011
4-nitrobenzonitrile	0.009	0.094	1000	TA100	-	0.001
2,4-Dinitro-5-methylphenol	0.085	0.032	500	TA1537	-	0.007

* Not mutagenic.

+ Concentration in Phase III condensate water mixture.

++ Number of revertants minus control revertants : dose in μg tested.

§ Not found in field samples of condensate water (Reference 1).

the mutagenic potency (calculated as described under "Procedures"), the dose, Salmonella strain and metabolic requirements for obtaining the mutagenic potency figure, and the estimated contribution of the compound to the mutagenic potency of the overall mixture. Of the 34 compounds tested, 2,4,5-TNT, 3,5-DNA, 1,3,5-TNB, and 2,3,6-TNT had the highest mutagenic potency and therefore were considered to be the most mutagenic. All six of the dinitrotoluenes, the dinitroaniline, all seven monoaminodinitrotoluenes, 1,3-dinitrobenzene, trinitrobenzene, the four trinitrotoluenes, dimethyldinitrobenzene, monomethyldinitrophenol, and the two mononitrobenzonitriles tested positively in the Ames test but had much lower mutagenic potential. Of the three mononitrotoluenes, only the para-isomer was mutagenic. Three of four monoaminonitrotoluenes were mutagenic. Toluene and the two monomethylnitrophenols produced no detectable revertants in the tests. The data from the individual assays are in Appendix B.

The results of the Ames test on unirradiated and irradiated condensate water mixtures (30-component for Phase III tests) appear in Table 7. The undiluted condensate water melt was mutagenic in all strains with or without metabolic activation even at the lowest doses (50 λ per plate). At 100 ppm in aqueous solution the unirradiated condensate water was not mutagenic. When the condensate water was irradiated at 5 ml/min through the photolytic reactor (Reference 1, p. 14), positive results were observed with strains TA100 without metabolic activation and TA98 both with and without metabolic activation. The condensate water mixture irradiated at a rate of 50 ml/min through the reactor was negative in tests on strains TA1535 and TA100 and slightly positive in tests on TA98.

Table 7

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - CONDENSATE
WATER MELT*

Compound	Metabolic Activation	Amount of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		11	11	11	23	126
	+		6	12	22	41	113
Positive controls							
Sodium azide	-	1.0 µg	253				189
9-Aminoacridine	-	100		440			
2-Nitrofluorene	-	20				612	972
AF ₂	+				675		
2-Anthramine	-	2.5	11	9	10	31	133
	+	2.5	413	168	2328	2829	2717
Condensate water melt							
	-	50 µl	41	196	1409	1195	750
	-	70	24	215	1257	1297	978
	-	80	29	241	1561	1382	905
	-	100	29	328	1668	1641	1087
	-	300	1588	2011	2056	479	64
	-	500	51	219	738	1636	212
	+	50 µl	23	138	365	847	655
	+	70	18		1026	911	805
	+	80	34	201	1117	842	1028
	+	100	23		1052	1162	1190
	+	500	48		819	1761	934

* 30-Component Condensate Water Mixture undiluted.

Table 7 (Continued)

IN VITRO ASSAYS WITH *SALMONELLA TYPHIMURIUM*
CONDENSATE WATER

Compound	Metabolic Activation	Amount of Compound Added per Plate	Histidine Revertants per Plate		
			TAL535	TA98	TAL100
Negative control	-		17	19	92
	+		11	24	93
Positive controls					
Sodium azide	-	1.0 µg	162		311
2-Nitrofluorene	-	50		50	
2-Anthramine	-	2.5	6	12	107
	+	2.5	123	415	552
Pre-irradiated	-	0.25 ml	17	28	86
Condensate water (100 ppm) +	+	0.25	9	22	83
Condensate water 5*	-	0.05 ml	13	124	81
	-	0.10	15	183	114
	-	0.15	12	255	125
	-	0.20	9	339	160
	-	0.25			167
	+	0.05	11	59	104
	+	0.10	10	88	114
	+	0.15	10	131	100
	+	0.20	10	190	109
	+	0.25		174	122

* Condensate water 5 - reactor water flow rate 5 ml/min.

+ Condensate water 50 - reactor water flow rate 50 ml/min.

Table 7 (concluded)

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM

CONDENSATE WATER

<u>Compound</u>	<u>Metabolic Activation</u>	<u>Amount of Compound Added per Plate</u>	<u>Histidine Revertants per Plate</u>		
			<u>TA1535</u>	<u>TA98</u>	<u>TA100</u>
Condensate water 50+	-	0.05 ml	7	27	84
	-	0.10	9	27	112
	-	0.15	9	39	97
	-	0.20	18	41	106
	-	0.25		50	89
	+	0.05	8	34	92
	+	0.10	7	31	100
	+	0.15	8	39	114
	+	0.20	3	50	110
	+	0.25		58	

DISCUSSION

Acute Toxicity

The acute oral LD50s for the three condensate water mixtures tested ranged from 250 to 450 mg/kg in the rat (Table 2). These values are in the range reported¹⁴ for 2,4-dinitrotoluene (568 ± 59 mg/kg in males and 650 ± 49 mg/kg in females) and for 2,6-dinitrotoluene (535 ± 58 mg/kg in males and 795 ± 22 mg/kg in females), components that constitute 65 to 75% of the mixtures. Based on the values in the table, all three mixtures are moderately toxic.

The slightly greater toxicity of the 17-component mixture relative to the other two mixtures suggests that the more toxic components are being diluted out in the 30-component mixtures. The scarcity of acute toxicity data on condensate components in Sprague-Dawley rats tested under comparable conditions make it impossible to resolve this definitively. In aquatic toxicity studies, 2,4-DNT made the largest contribution to the overall toxicity of condensate water to *Daphnia*.¹⁵ This component was also substantially diluted in changing to the 30-component formulations (Table 1). 2,3,6-TNT, a significant component only in the 30-component mixture for Phase III testing, made almost the same contribution to the toxicity of that mixture as did 2,4-DNT in the aquatic tests. The increase in the 2,3,6-TNT content of the Phase III mixture then may be responsible for the slight increase in its acute toxicity relative to the 30-component mixture for Phase II tests. These observations are consistent with the concept that the differences in toxicity of the mixtures is due to differences in the toxicity of the main components and their relative content in the mixtures.

The LD50s for all three mixtures were lower in females than in males, significantly so for the two 30-component mixtures. This sex difference was not found with the two major components, 2,4-DNT and 2,6-DNT.¹⁴ Other components in the mixture may be responsible for the difference. The fact that the mixtures had higher toxicities than expected on the basis of their 2,4- and 2,6-DNT contents may be understood in similar terms.

The 17-component condensate mixture was less toxic to mice than to rats. Others have found that the acute oral LD50 of 2,4-DNT is at least two times higher in mice than in rats, whereas the values for 2,6-DNT are almost the same.¹³ Since 2,4-DNT makes up over 50% of the mixture by weight, it seems likely that the difference in LD50s for the mixture in rats and mice is due mainly to this component.

Skin and Eye Irritation

Based on irritation tests in the rabbits, the 17-component condensate water mixture is virtually nonirritating to eyes and only mildly irritating to skin. These findings are essentially identical to those on 2,4- and 2,6-DNT, the major components in the mixture.¹⁴

Skin Sensitization

The 17-component condensate water mixture provoked a reaction in the skin of 62.5% of the guinea pigs tested. Based on the criteria used,⁵ condensate water is a moderate allergen. In the same test, 2,4,6-TNT has also been found to be moderately sensitizing, 2,6-DNT mildly sensitizing, and 2,4-DNT nonsensitizing.¹⁴

In Vitro Mutagenicity Testing

The mutagenic potency of 34 nitrotoluene analogues, 30 of which have been found in samples of condensate water, was calculated from their mutagenic responses in the most active of the tests performed on them. In Table 6, which presents a summary of these results, most of the mutagenic compounds were detected by strain TA100. Four of the compounds were in quantities not always detectable in the condensate water mixtures. Two--1,3-nitrotoluene (not present in condensate water) and 4-amino-2-nitrotoluene--were not mutagenic in these assays. The other two--2,3,4- and 2,4,5-trinitrotoluene--were mutagenic. However, these have not been detected in condensate water.

In these assays, the mutagenic potency of 1,3-dinitrobenzene is not high relative to the other compounds tested. However, due to its high concentration in condensate water, it may be the greatest contributor to the mutagenicity of the condensate water melt. In these assays, 1,3-dinitrobenzene together with 2,3,6-trinitrotoluene, 2,4-dinitrotoluene, and 1,3,5-trinitrobenzene contribute over 60% of the mutagenic activity of the condensate water, although they comprise less than 15% of the mixture by weight. The three most prevalent components in the mixture--1,3-dinitrobenzene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene--contribute over 40% of the activity.

Irradiated condensate water elicited a greater mutagenic response after irradiation at 5 ml/min than at 50 ml/min. Irradiation converts the condensate water mixture to one that is more mutagenic in the Ames test and the degree of mutagenicity is directly related to the extent of irradiation.

PART 2 - SUBACUTE ORAL TOXICITY STUDIES OF CONDENSATE WATER
(PHASE II)

INTRODUCTION

This section discusses the 90-day subacute oral toxicity studies of condensate water (blend) in dogs, rats, and mice. These studies were performed (1) to define toxic symptoms arising from repeated oral doses of a representative condensate blend and to identify the target organs or systems; (2) to establish a dose-response relationship where possible; (3) to establish no-effect levels for exposure of the species to the condensate water; and (4) to provide guidelines for establishing the dose levels to use in the chronic studies. The reversibility of any adverse effects was assessed in groups of rats and mice allowed to recover for 4 weeks after discontinuation of treatment with the condensate water.

GENERAL METHODS

This section contains a description of the following general methods used for this Phase II study of dogs, rats, and mice:

Hematology
Clinical Chemistry
Urinalysis
Pathology
Statistical Methods
Quality Assurance

Hematology

Erythrocyte, Leukocyte, Hematocrit, and Mean Corpuscular Volume

A Coulter electronic particle counter (Model ZBI) with a 100- μ aperture¹⁶ is used to determine hematocrit, erythrocytes, leukocytes, and mean corpuscular volume (MCV). The instrument is standardized daily in a two-step process as follows: The electronics are first checked for proper functioning by a standard procedure. Then the instrument is standardized for erythrocyte and leukocyte counts and for hemoglobin, hematocrit, and mean corpuscular volume against 4C normal and abnormal control standards (Coulter Electronics Inc.). Each blood sample was counted in duplicate.

Hemoglobin (Hgb)

Hemoglobin is determined in a Coulter hemoglobinometer as cyanomethemoglobin.¹⁷ Cyanomethemoglobin standards were supplied by Coulter Electronics Inc. as part of the 4C control standard. Duplicate tests were run on each blood sample.

Mean Corpuscular Volume (MCV)

MCV is determined in the Coulter counter after (daily) standardization by the Wintrobe microhematocrit method. MCV on each test sample is determined in duplicate.

Hematocrit (Hct)

Hematocrit is calculated automatically in the Coulter counter from the following equation:

$$\text{Hct} = \text{RBC} (10^6/\text{mm}^3) \times \text{MCV} (\mu^3) .$$

Mean Corpuscular Hemoglobin (MCH)

MCH was calculated as follows:

$$\text{MCH} (\mu\text{g}) = \frac{\text{Hgb} (\text{g } \%) \times 10}{\text{RBC} (10^6 \times \text{mm}^3)} .$$

Mean Corpuscular Hemoglobin Concentration (MCHC)

MCHC is calculated as follows:

$$\text{MCHC } \% (\text{g } \%) = \frac{\text{Hgb} (\text{g } \%) \times 100}{\text{Hct}} .$$

Differential Leukocyte Counts

Leukocytes are stained with Wright's stain for examination and counting under a light microscope. Cell types identified and counted are polymorphonuclear cells, band cells, lymphocytes, atypical lymphocytes, monocytes, eosinophils, and/or basophils.

Reticulocyte Count (Retic)

Heinz bodies are stained with methyl-violet and the percentage is calculated. Heinz bodies were not reported in the text unless the test was positive.

Clinical Chemistry

The clinical chemistry tests described below were performed at SRI International on the blood samples. These tests represent a GEM 15 (GEMSAEC 15) profile as described in GEMSAEC manual (Technical Publication No. I.M. 030085, May 1976) by Electro-Nucleonics, Inc. (Fairfield, NJ).

GEMSAEC is a computerized and automated blood analyzer system made up of five component modules. GEMSAEC performs either endpoint or kinetic type analyses. The instrument centrifugally mixes reagents and clinical samples, moving the mixture through the light path of a spectrophotometer, the output of which is converted to digital data for computation in a digital minicomputer and is printed out on a teletypewriter. A small integral oscilloscope allows visual monitoring of analyses. Standardization for each test was made on every 16 samples, using Smith Kline Instruments Inc. human reference sera (normal and abnormal).^{18,19}

BUN (mg %)

The GEMSAEC method used for determination of BUN is a modification of the procedure described by Falke and Schubert.²⁰ This method of determining urea in blood involves release of ammonia from urea by the action of urease. It serves as substrate with α -ketoglutarate for the enzyme glutamic dehydrogenase, forming glutamate. In this reaction, reduced nicotinamide adeninedinucleotide (NADH) is oxidized, the amount being proportional to the amount of urea in the sample. The oxidation is followed quantitatively by the decrease of absorbance at 340 nm as NAD^+ is formed from NADH.

Creatinine (mg %)

Creatinine is analyzed by the original method of Jaffe,²¹ in which the creatinine is allowed to react with saturated picric acid in alkaline solution at 30° to produce a bright orange-red solution. Analysis in the colorimeter is performed at 520 nm.

Uric Acid (mg %)

For determination of uric acid in clinical specimens, uric acid is oxidized by the specific enzyme uricase to allantoin, CO_2 , and H_2O_2 .²² In the presence of catalase, the H_2O_2 formed is used to oxidize methanol to formaldehyde. The formaldehyde is transformed by the Hantzsch reaction,²³ in the presence of acetylacetone and ammonia, into a yellow-colored lutidine derivative. The yellow color of this dye is directly proportional to the concentration of uric acid. The color is measured photometrically between 405 and 415 nm.

Calcium (mg %)

The GEMSAEC calcium analysis determines calcium colorimetrically, using a metal-complexing dye, cresolphthalein complex, and a diethylamine base reagent. 8-Hydroxyquinoline is present in the test to eliminate any interference due to magnesium ions. A red-purple complex forms that is proportional to the amount of calcium present.²⁴

Phosphorus (mg %)

Inorganic phosphorus is determined by the phosphate ions in the serum reacting with ammonium molybdate in the presence of sulfuric acid²⁵ to form phosphoromolybdic acid. This is then reduced by ferrous ammonium sulfate to form a blue-colored complex with a maximum absorbance at 675 nm. The formation of the blue complex is proportional to the concentration of phosphorus in the sample.

Glucose (mg %)

Glucose reacts with adenosine triphosphate (ATP) in the presence of hexokinase with the formation of glucose-6-phosphate and adenosine diphosphate (ADP). Glucose-6-phosphate reacts with nicotinamide adenine dinucleotide (NAD^+) in the presence of glucose-6-phosphate dehydrogenase with the formation of 6-phosphogluconate and NADH. The NADH produced absorbs strongly at 340 nm.²⁶

Total Bilirubin (mg %)

Determination of serum bilirubin in the GEMSAEC is effected in the presence of caffeine. Sodium benzoate bilirubin couples with diazotized sulfanilic acid to form azobilirubin, which is pink and has an absorbance maximum around 545 nm. This reaction is very rapid and is performed outside the analyzer by adding caffeine sodium benzoate to the serum. Addition of sodium-potassium tartrate changes the pH to highly alkaline and moves the absorbance maximum to 600 nm. The absorbance at 600 nm is proportional to the total bilirubin concentration in the serum.²⁷

Cholesterol (mg %)

Cholesterol is determined by the automated method of Allain et al.²⁸ in which cholesterol esters are hydrolyzed to free cholesterol and fatty acids by cholesterol esterase. The cholesterol released by this process and that pre-existing free in the sample are then oxidized by the enzyme cholesterol oxidase. The hydrogen peroxide released in the oxidation step reacts with 4-aminoantipyrine and phenol in the presence of horseradish peroxidase. The quinone imine product is red in color, with λ_{max} at 500 nm.

Triglycerides (mg %)

Analysis for serum triglycerides involves the enzymatic hydrolysis of the compounds to glycerol and free fatty acids.²⁹ A solution of glycerol kinase and pyruvate kinase converts glycerol to pyruvate, which in turn is reduced by NADH and lactic dehydrogenase to lactate (followed at 340 nm).

SGOT (IU/L)

Serum glutamic-oxaloacetic acid transaminase (SGOT) activity is measured by following the rate of change of NADH absorption at 340 nm and 30° produced by maleate dehydrogenase. The latter enzyme system is coupled with GOT-catalyzed transamination of aspartic acid and α -ketoglutarate in the medium.^{30,31}

SGPT (IU/L)

Serum glutamic-pyruvic acid transaminase (SGPT) activity is monitored in the same manner as SGOT except that alanine is substituted for aspartic acid and the coupling enzyme is lactate dehydrogenase.^{30,31}

LDH (IU/L)

Lactate dehydrogenase (LDH) activity is determined directly by monitoring the rate of change in absorption at 340 nm in the presence of added L-lactic acid and NAD^+ .³²

Alkaline Phosphatase (IU/L)

In the GEMSAEC method for determining alkaline phosphatase, p-nitrophenyl phosphate is used as the substrate and the enzyme acts to form p-nitrophenol and inorganic phosphate or mannitol phosphate as products. The released p-nitrophenol is in the form of the dissociated phenylate ion at the reaction pH, which form has a distinctive yellow color that absorbs light maximally at a wavelength of 405 nm.³³

Total Protein (g/L)

The method for total protein is based on the biuret method, adapted for use with the GEMSAEC analyzer.³⁴

Albumin (g/L)

The GEMSAEC method utilizes the reactivity of albumin with bromocresol green (BCG) to form an albumin-BCG complex that can be quantitated colorimetrically at 628 nm.³⁵

Other

Globulin and albumin/globulin (A/G) ratios are not ordinarily a part of the SRI Clinical Chemistry Laboratory output with the GEMSAEC. Approximate values for each may be calculated using the total protein and albumin mean values in the clinical chemistry tables. These calculations were done by hand, but, since no consistent pattern was found in the results, the computer was not reprogrammed so as to include these data in the tables.

Urinalysis

Routine urine analyses as performed at SRI include color, specific gravity, pH, protein, glucose, ketone, bilirubin, urobilinogen, occult blood and microscopic examination of the sediment.

All tests except those specified below are done with colorimetric multistix (Miles Laboratories, Elkhart, Indiana). The exceptions are color, specific gravity, and microscopy. Color is estimated visually and specific gravity is determined in an AO TS meter. The urine sediment obtained by centrifugation is examined microscopically for cells, casts, bacteria, and crystals. Each, excepting crystals, is usually reported as a quantity per low or high power field.

Pathology

Euthanasia

Dogs are anesthetized by injection of "Pentothal" (sodium thiopental) (Abbott Laboratories, North Chicago, Illinois) in the cephalic vein; then they are exsanguinated. Rats and mice receive sodium pentobarbital intraperitoneally.

Postmortem (Gross) Examination

External. The physical condition of the animal is observed and recorded. Lesions are sought in skin, eyes, and other structures in which they are externally evident. The nature and quantity of discharges from any of the body openings are also noted.

Internal. The carcass is opened systematically, starting anteriorly and proceeding caudally. The brain is removed first, followed by the eyes. Neck organs and thoracic, abdominal, and pelvic viscera are observed in situ and removed. Hollow viscera are opened and examined grossly. Solid viscera are carefully sliced and examined. All abnormalities are described. Specimens ≤ 5 mm thick are placed in neutral buffered formalin for not less than 3 days.

Organ Weights. Specified organs are trimmed, each in a routine manner, and the weights are recorded. Bile is released from the cholecyst prior to measuring liver weight. In the case of large animals, the heart is opened for release of unclotted blood or removal of clots before it is weighed. The ratio of organ weight to body weight and to brain weight is determined.

Microscopic Examination

Specified fixed tissues and lesions that always include some adjacent normal tissue are processed to hematoxylin and eosin-stained slides for histopathologic evaluation. If, in the judgment of the pathologist, special stains are required, they are requested.

Reports include individual findings, group incidences, intergroup comparisons, and determination of spontaneity or relationship to experimental treatment.

Statistical Methods

A common tabular format has been developed to allow a rapid comparison of group results from toxicologic studies. For the majority of the parameters measured in such studies (body weights, weight gains, organ weights, hematology, and clinical chemistry), the tables contain the mean parameter value for each treatment group along with the standard error of the mean and the number of animals in the group. For food consumption (which is measured on a cage basis rather than on an animal basis), the tables contain the mean food consumption for each treatment group and the number of animals in the group. The tables compactly display a large portion of the quantitative data gathered in the study (aside from observations made during the study on animal appearance and behavior and during necropsy on abnormalities).

Statistical procedures have been applied to the data in the tables to aid the investigator in identifying the significant results (that is, difference in mean parameter values that would be unlikely to have resulted from natural biological variability).

In this study on condensate water, the statistical tests were applied to the data on body weights, weight gains, organ weights, hematology, and blood chemistry whenever the group size was three or larger. The statistical tests were not applied when the group size was one or two animals, since the tests depend on the approximate normality of the distribution of the mean and these sample sizes were judged too small to give reasonable assurance of this normality.

To permit easy identification of the statistically significant results and to form a visual pattern that will naturally lead the investigator's attention to clusters of significant results, the significance of these statistical tests is denoted by the use of symbols (+, *) and letters (A,B,C,D) placed on the same tables as the means, standard errors, and group sizes.

The first statistical test is Bartlett's chi-square test.³⁶ This test examines the variances of the treatment and control groups and flags the condition of unequal variances. If Bartlett's chi-square test is not significant at the 5% level, no symbol is printed in the B column. The symbol * denotes that the test is significant at the 5% level and the symbol + denotes that the test is significant at the 1% level. The primary use of Bartlett's chi-square test is in the selection of the proper statistical tests for examination of the means of the treatment and control groups.

Next, each treatment mean is examined to determine whether it is significantly larger or smaller than the control mean. If the Bartlett's chi-square test is not significant at the 5% level, the statistic used for this comparison is a t-statistic computed with a pooled variance estimate. This statistic is compared with a Scheffe multiple comparison cutoff value for contrasts to determine its significance. The pooled variance estimate is derived using all the groups. This test is known as Scheffe's test³⁷ and, as a simultaneous statistical procedure, guarantees a significance level of 5% or 1% over all the treatment-control comparisons. If Bartlett's chi-square test is significant at the 5% (or 1%) level, the statistic used for the treatment-control comparison is a t-statistic computed with separate group variance estimates. This statistic is compared with a Student's t-cutoff value. This t-test is not a simultaneous test. On the basis of Bartlett's chi-square test, the computer automatically decides which treatment-control comparison to compute. In either case, a result significant at the 5% level is denoted in the T column by a * and a result significant at the 1% level is denoted by a +.

While the t - and Scheffe tests assess whether the treatment and control means are significantly different, Finney's ratio test (Reference 2, pp. 76-80) assesses the magnitude of that difference. Finney's ratio test is a procedure for examining the ratio of each dose group mean to the control group mean, while taking into account the variability demonstrated in the data. In particular, this test is used to form a 95% confidence interval for the ratio of a dose group mean to the control mean. If the confidence interval lies entirely above 1.10 or below 0.90, the symbol A is printed. If the confidence interval lies entirely above 1.20 or below 0.80, the symbol B is printed. The symbol C corresponds to an interval above 1.35 or below 0.65 and the symbol D corresponds to values of 1.50 and 0.50. Thus, using Finney's ratio test, if the letter D were printed, we might be able to say that we are 95% confident that at the highest dose level the mean response is at least 150% of the control group mean response. The computer program automatically uses either separate or pooled variance estimates in Finney's ratio test, depending on whether Bartlett's chi-square test is significant. The ratio test is not a simultaneous test statistic in either case, however. The symbol x is printed if the ratio test cannot be computed.

Food consumption was analyzed statistically for differences using the Williams test.³⁸ Williams' test is a procedure for testing the statistical significance of a difference between the mean values for the dose-related groups and the mean value for the control group. This procedure is particularly sensitive to a monotone increasing or decreasing response relationship with increasing dose. This test, which is a simultaneous statistical procedure, is similar to Duncan's test but is more powerful for the stated alternatives. The symbol * is printed after each value that is significant at the 5% level. This significance level refers to the two-sided version of the test.

Quality Assurance

The detailed procedure for the extraction and clean-up of condensate feed extracts is presented on page 34. It consists of a dichloromethane extraction, clean-up on a silica gel column, and capillary gas chromatography (gc) analysis. Recovery studies were performed at each concentration level. The results were: >99% recovery for 16 components at the 0.10% level; >97% recovery based on 1,3-dinitrobenzene and 2,4- and 2,6-dinitrotoluene concentrations at the 0.01% level; and >95% at the 0.001% level based on recovery of the three main components, which represent 78% of the condensate blend.

If the silica gel column was not given a hexane wash prior to the dichloromethane elution step, interferences were observed in the gc analyses of condensate water. The interferences are tolerable at the 0.10% condensate blend level in feed; however, they become quite troublesome at the 0.01 and 0.001% levels.

EXTRACTION AND CLEAN-UP OF CONDENSATE COMPONENTS IN FEED

1. Weigh out 13-15 g of feed in tared flask.
2. Add 1 ml x 0.0166 mg/ml p-DNB/ CH_2Cl_2 to the 0.001% condensate water (CW) feed, 1 ml x 0.166 mg/ml p-DNB/ CH_2Cl_2 to the 0.01% CW feed, and 1 ml x 1.66 mg/ml p-DNB/ CH_2Cl_2 to the 0.10% CW feed.
3. Add ~80 ml of CH_2Cl_2 to flask. Stir with magnetic stirring bar for 30 minutes.
4. Prepare Celite filter pad in 7-cm buchner filter (1/2").
 - (i) Slurry about 50-70 ml Celite with CH_2Cl_2 .
 - (ii) Pour slurry into filter with 7-cm #1 Whatman paper with a light vacuum.
 - (iii) Do not dry completely. Place additional paper on top.
5. Add feed/ CH_2Cl_2 to Celite filter with vacuum. Rinse flask 3 times with about 15 ml of CH_2Cl_2 each time. Add to filter.
6. Transfer filtered extraction to round bottom flask.
7. Rotary evaporate at 30° C down to 1-2 ml.
8. Prepare silica gel (Florisil) column (2.5-cm I.D. column).
 - (i) Measure out 35 ml of silica gel into an 80-ml beaker.
 - (ii) Add some hexane and slurry.
 - (iii) Place a small plug of glass wool at bottom of column.
 - (iv) Add silica gel/hexane slurry to column via wide bore funnel. Rinse beaker with additional hexane and add to column until most of silica gel slurry is transferred.
 - (v) Drain hexane level down to 1 inch above silica gel level and add 1-2 cm of Na_2SO_4 .
 - (vi) Drain hexane down to top of Na_2SO_4 level.
9. With pipet, add feed extract to column. Drain to Na_2SO_4 level.
10. Measure 100 ml of hexane in a graduated cylinder and then add ~10 ml to the round bottom flask that contained the feed extract. Swirl. Add to column. Drain to Na_2SO_4 level. Add remaining 90 ml of hexane to column and drain to Na_2SO_4 level. Discard hexane eluent.
11. Add 100 ml of CH_2Cl_2 to column and collect in round bottom flask (for the 0.01% CW feed, use 200 ml of CH_2Cl_2). Let column run dry.
12. Rotary evaporate at 30° to 1-2 ml. Transfer to 2-dram vial with teflon liner. Further concentrate with N_2 .
13. GC under the following conditions:

Column: 60 meter SE-30 capillary column.
Temperature: 130° (48° min hold) → 220° (20 min hold) @ 4°/min.
Flow rate: 0.4 ml/min N_2 .
Split ratio: 100/1.
Detector: Flame ionization.

A sample gas chromatogram is shown in Appendix I.

Note: Silica gel 80/200 mesh. Prewashed with toluene and hexane stored at 150° C.

Following the hexane wash, dichloromethane readily elutes the dinitrotoluenes and 1,3-dinitrobenzene. Further elution with dichloromethane extracts the aminodinitrotoluenes and a number of contaminants, including fats and oils.

Percentage recovery of condensate water components from the feed stocks, expressed as mean and standard deviation, was $83 \pm 8.7\%$ for the 0.10% condensate water level, $82 \pm 7.9\%$ for the 0.01% level, and $77 \pm 6.4\%$ for the 0.001% level. There was no significant change in the relative ratio of the individual components in the 0.10% condensate water mix recovered.

STUDIES IN DOGS

Procedures

Housing and Maintenance

Forty AKC-registered beagles from Marshall Laboratory Animals, North Rose, New York, were used in these experiments. The dogs were born September 1-24, 1977 and arrived at SRI February 15-23, 1978, identified by ear tattoos. They were inspected and numbered with metal tags on chain collars. In addition, identification cards were attached to the cages in which they were held for a 3-week quarantine period. All dogs were examined and found healthy by the DVM. They were transferred to outdoor runs and the study was initiated on March 23, 1978.

The dogs were housed two to a run or singly in covered outdoor runs that are protected from inclement weather by a roof, walls, and side curtains. Four hundred \pm 5 g of dry Purina Field and Farm Kibble daily per dog was placed in the food pans immediately after the dogs were dosed. The food was picked up for reweighing 3 to 4 hours later. (The dogs had been trained on this feeding schedule while they were in quarantine.) Food consumption was determined daily for each run, 5 days per week. Food consumption/animal/day was calculated from the sum of the food consumed by dogs in each group over this 50-day period divided by the sum of the number of days each dog in the group survived (5 x number of dogs/group if none died prematurely). On weekends, the dogs received approximately the same amount of food per day but the unconsumed food was not weighed.

Treatment Protocol

The beagles were divided into three treatment groups and one control group; there were five males and five females in each group. All treated beagles were dosed daily by capsule until the day they were killed, unless otherwise indicated. Controls were given capsules containing the lactose only, daily for the same period.

The condensate blend for the subacute studies was prepared in the same manner as described in Part 1 and had the composition given in Table 1 for the mixture used in Phase II testing. It was received in the form of a sticky paste. The quantity (5 g) to be mixed with the lactose (USP) diluent was weighed out in a beaker on a Mettler P162 balance and dissolved in a minimum volume of acetone with stirring, while being protected from light with aluminum foil. This same volume of acetone was used to dissolve the medium and low dose amounts of condensate water. To prepare each stock mixture, the acetone was mixed

with 95 g of lactose powder in a large dish that was covered loosely with aluminum foil until the acetone evaporated. (The same procedure was followed for control samples, using lactose and acetone alone.) The doses to be administered were then weighed under a ventilated hood on the Mettler balance to ± 0.01 g on the basis of the weight of the dog to receive the dose. The doses were then placed in 1/8-oz. gelatin capsules. Control dogs were given capsules containing the same amount of lactose powder, treated in the same way with acetone. Dose levels administered were 0.0, 0.05, 0.5, and 5.0 mg condensate water/kg of body weight. The compounds and capsules were stored in the dark in a refrigerator until used. The dogs were dosed between 9:30 and 11:30 AM each day.

Quality control consisted of determining whether given quantities of condensate water (usually 300 g batches) were used up in preparing the gelatin capsules in the expected period of time. This was invariably the case. Quality control on individual gelatin capsules or capsules prepared specially for that purpose was not performed.

Tests

All dogs were observed daily during capsule administration and feed weighings, and unusual signs were recorded. They were weighed once a week. Food consumption was recorded 5 days a week.

Hematology and clinical chemistry determinations were performed on blood samples from surviving animals at 0, 8, 17, and 24 weeks. Approximately 6 ml of blood was drawn from the jugular vein of each dog via a 10-ml syringe with a 20-gauge, 1.5-inch needle. Two ml of the fresh blood was immediately transferred to a 2-ml Vacutainer containing EDTA anticoagulant for hematology (CBCs, including differential counts). After clotting, the remaining 4 ml of blood was centrifuged for 10 minutes at 2000 rpm in an IEC International Universal Model UV centrifuge. The serum was transferred by syringe to an additive-free 10-ml Vacutainer and refrigerated. The whole blood and serum samples were analyzed in the SRI Clinical Chemistry Laboratory.

Dogs were killed beginning on day 176 and continuing intermittently over a 9-day period. An equal number of the same sex from each group were killed on any sacrifice day.

At sacrifice, each dog's brain, heart, liver, kidneys, spleen, gonads, thyroid, and adrenals were weighed immediately and the absolute weights were recorded. Organ-to-body weight and organ-to-brain weight ratios were calculated from these data. All the data on body and organ weights, hematology, and clinical chemistry were compiled and evaluated statistically as described in the previous section.

All tissues or representative sections were fixed in 10% neutral buffered formalin and saved for histopathological analysis. Other tissues examined grossly and microscopically were the aorta, bone, bone marrow (smears only), colon, cholecyst, duodenum, epididymis, esophagus, eye, ileum, jejunum, lung, lymph node, sciatic nerve, pancreas, parathyroid, pituitary, prostate, salivary gland, seminal vesicles, uterus, skeletal muscle, spinal cord, stomach, thymus, trachea, urocyst, and vagina. The methods used to prepare and examine slides are described in the previous section.

Results

Observations

No unusual symptoms were observed in any dog during the study with the exception of C3-33 and C3-31, both high-dose males. The latter had stiff hind legs, arched back, slight incoordination, and yellow urine on Days 132 and/or 133. These effects were transitory and did not appear again.

Dog C3-33 exhibited multiple signs of toxicity that began during Week 6 and lasted throughout the remainder of the study. On Day 42, this male began to show poor coordination, disorientation, and flaccidity of the hind legs (the left one being weaker). Within a few days, spasms were noted, with the hind legs being rigidly outstretched (the left one more so) and the back arched. The animal had difficulty standing (tending to fall backwards) and exhibited spasticity of the forelimbs and nystagmus. When carried, the dog experienced convulsions. He resisted flexion of the legs and had no gag reflex. His pupils were dilated.

By Day 50, the dog had stopped eating and resisted water. He needed support to stand and had no control over his neck extensors. He had a slow righting reflex, and rigidly flexed legs, and nystagmus. On Day 54, in addition to these symptoms, he had no menace response. He did show a slight gag reflex, however, and did eat with help. Improvement continued and within 2 days he was able to sit or "crouch stand," and eat by himself. Shortly thereafter he was able to stand on his own and take a few steps. He exhibited no hand-clap response; if he did hear sounds, he appeared to have difficulty locating the source. He had difficulty controlling his head; it constantly swung from side to side.

This brief period of improving condition was followed by one of further deterioration, beginning on Day 64. He needed assistance in eating. By Day 74, his hind legs were rigidly extended, unable to flex. He had difficulty crawling and was disoriented. These symptoms continued over the next four weeks and were followed by cycles of some signs of improvement (about 2 weeks) and then regression (another 2 weeks). By Day 132 his condition was more serious. He made no attempt

to stand and his breathing was slow and labored. Any head movement caused nystagmus. His legs were either flexed or rigid, his head was manipulated without control, and his jaws were clamped tight. He would lie curled on his chest and then be "thrown violently" onto his side, with head muscles tense and trembling. On Days 137 and 138 he was not dosed at all because of the difficulty in opening his jaws. His teeth had punctured his lips, he had no control over his head (it banged against the cage sides or floor when he tried to move), and his hind and fore legs were not coordinated. On Day 139 he was better, presumably because of discontinuation of dosing. He was able to raise his head and eat canned food, although this was done ravenously and with wild snapping. In order to sustain this animal until sacrifice, he was continued on canned food for the remainder of the study. He seemed more alert and was able to lift his hindquarters some, but in trying to do so he would paddle with hind and fore legs going at different rates of speed.

The next day dosing was resumed. Although some slight improvement in condition was noted, the animal continued to remain quadriplegic and to have spasticity of the hind limbs, dilated pupils and possible blindness, no menace or reaching reflexes, nystagmus, and weakness of the dorsal neck muscles. These or variants of these symptoms persisted until sacrifice.

Body Weights

The mean body weights of the dogs in each group over the 24-week study are given in Tables 8 and 9. The treatment with condensate blend was without significant effect on body weights of either males or females during this period. Since week-to-week changes in body weight were slight, body weight differences are not presented.

Food Consumption

Food consumption data for these dogs are presented in Tables 10 through 13. These data were also unremarkable.

Organ Weights

Organ weights and organ-to-body and organ-to-brain weight ratios appear in Tables 14 and 15. The only differences cited in the t-test are male heart-to-body weight (high) and female spleen-to-body weight (also high) ratios at the high dose. Male kidneys and kidney-to-body and kidney-to-brain weight ratios appeared to increase linearly with dose (Appendix D, Table D-1). Since these values are well within normal limits (Appendix E, Tables E-1 and E-2), no toxicological significance is attached to them.

TABLE 8

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (KG)
OF MALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY		.5 MG/KG/DAY		5.0 MG/KG/DAY	
			T	R	T	R	T	R
INITIAL		8.24 ± .242 (5)	8.18 ± .325 (5)		8.38 ± .201 (5)		7.88 ± .530 (5)	
WEEK 1		8.56 ± .325 (5)	8.52 ± .233 (5)		8.74 ± .186 (5)		8.16 ± .503 (5)	
WEEK 2		8.68 ± .353 (5)	8.48 ± .360 (5)		9.12 ± .215 (5)		8.54 ± .512 (5)	
WEEK 3		8.96 ± .413 (5)	8.78 ± .396 (5)		9.32 ± .215 (5)		8.90 ± .594 (5)	
WEEK 4		9.04 ± .384 (5)	8.68 ± .404 (5)		9.50 ± .268 (5)		8.84 ± .614 (5)	
WEEK 5		9.42 ± .404 (5)	8.90 ± .466 (5)		9.64 ± .254 (5)		9.02 ± .648 (5)	
WEEK 6		9.54 ± .423 (5)	8.96 ± .492 (5)		9.80 ± .305 (5)		8.94 ± .659 (5)	
WEEK 7		9.66 ± .397 (5)	9.02 ± .445 (5)		9.90 ± .354 (5)		9.04 ± .705 (5)	
WEEK 8		9.58 ± .403 (5)	9.14 ± .482 (5)		10.08 ± .450 (5)		8.74 ± .767 (5)	
WEEK 9		9.78 ± .435 (5)	9.18 ± .488 (5)		10.16 ± .486 (5)		8.86 ± .771 (5)	
WEEK 10		10.00 ± .409 (5)	9.36 ± .499 (5)		10.38 ± .493 (5)		8.96 ± .808 (5)	
WEEK 11		10.18 ± .384 (5)	9.34 ± .465 (5)		10.42 ± .499 (5)		9.10 ± .821 (5)	
WEEK 12		10.24 ± .433 (5)	9.38 ± .414 (5)		10.52 ± .453 (5)		9.10 ± .799 (5)	
WEEK 13		10.34 ± .415 (5)	9.52 ± .500 (5)		10.58 ± .518 (5)		9.28 ± .749 (5)	
WEEK 14		10.44 ± .418 (5)	9.50 ± .473 (5)		10.60 ± .552 (5)		9.38 ± .737 (5)	
WEEK 15		10.44 ± .403 (5)	9.44 ± .501 (5)		10.60 ± .594 (5)		9.46 ± .751 (5)	
WEEK 16		10.36 ± .489 (5)	9.46 ± .496 (5)		10.66 ± .598 (5)		9.56 ± .712 (5)	
WEEK 17		10.56 ± .474 (5)	9.52 ± .479 (5)		10.74 ± .593 (5)		9.68 ± .726 (5)	
WEEK 18		10.58 ± .450 (5)	9.64 ± .474 (5)		10.86 ± .610 (5)		9.84 ± .752 (5)	
WEEK 19		10.74 ± .485 (5)	9.60 ± .491 (5)		10.78 ± .634 (5)		9.74 ± .678 (5)	
WEEK 20		10.70 ± .552 (5)	9.62 ± .500 (5)		10.96 ± .590 (5)		9.54 ± .719 (5)	
WEEK 21		10.64 ± .509 (5)	9.62 ± .489 (5)		10.84 ± .699 (5)		9.56 ± .741 (5)	
WEEK 22		10.56 ± .520 (5)	9.32 ± .458 (5)		10.64 ± .606 (5)		9.42 ± .743 (5)	
WEEK 23		10.54 ± .531 (5)	9.32 ± .479 (5)		10.66 ± .705 (5)		9.56 ± .722 (5)	
WEEK 24		10.18 ± .474 (5)	9.08 ± .499 (5)		10.36 ± .571 (5)		9.50 ± .739 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

* CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10% - A.

20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 9

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (KG)
OF FEMALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	TREATMENT GROUPS					
		CONTROL GROUP	.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
INITIAL		6.82 ± .368 (5)	6.88 ± .392 (5)		7.36 ± .260 (5)		6.82 ± .092 (5)
WEEK 1		6.98 ± .389 (5)	6.98 ± .407 (5)		7.38 ± .276 (5)		6.98 ± .165 (5)
WEEK 2		7.00 ± .383 (5)	7.04 ± .434 (5)		7.52 ± .312 (5)		7.12 ± .153 (5)
WEEK 3		7.18 ± .453 (5)	7.12 ± .403 (5)		7.66 ± .331 (5)		7.26 ± .186 (5)
WEEK 4		7.24 ± .489 (5)	7.16 ± .403 (5)		7.80 ± .339 (5)		7.34 ± .178 (5)
WEEK 5		7.50 ± .504 (5)	7.34 ± .456 (5)		7.94 ± .344 (5)		7.56 ± .213 (5)
WEEK 6		7.58 ± .525 (5)	7.44 ± .444 (5)		8.04 ± .344 (5)		7.56 ± .197 (5)
WEEK 7		7.72 ± .548 (5)	7.46 ± .435 (5)		8.10 ± .381 (5)		7.66 ± .244 (5)
WEEK 8		7.76 ± .614 (5)	7.52 ± .455 (5)		8.26 ± .406 (5)		7.68 ± .235 (5)
WEEK 9		7.96 ± .591 (5)	7.62 ± .455 (5)		8.36 ± .406 (5)		7.88 ± .246 (5)
WEEK 10		8.06 ± .590 (5)	7.66 ± .439 (5)		8.46 ± .480 (5)		7.90 ± .263 (5)
WEEK 11		8.18 ± .606 (5)	7.68 ± .392 (5)		8.42 ± .435 (5)		7.92 ± .271 (5)
WEEK 12		8.24 ± .578 (5)	7.82 ± .404 (5)		8.56 ± .442 (5)		8.18 ± .331 (5)
WEEK 13		8.40 ± .577 (5)	7.86 ± .384 (5)		8.64 ± .457 (5)		8.10 ± .315 (5)
WEEK 14		8.38 ± .567 (5)	7.78 ± .360 (5)		8.68 ± .484 (5)		8.20 ± .336 (5)
WEEK 15		8.34 ± .628 (5)	7.80 ± .332 (5)		8.66 ± .477 (5)		8.24 ± .341 (5)
WEEK 16		8.30 ± .672 (5)	7.88 ± .345 (5)		8.64 ± .465 (5)		8.20 ± .308 (5)
WEEK 17		8.24 ± .631 (5)	7.94 ± .412 (5)		8.66 ± .479 (5)		8.26 ± .336 (5)
WEEK 18		8.42 ± .697 (5)	8.06 ± .370 (5)		8.98 ± .487 (5)		8.36 ± .353 (5)
WEEK 19		8.36 ± .648 (5)	8.12 ± .383 (5)		8.92 ± .485 (5)		8.44 ± .367 (5)
WEEK 20		8.36 ± .688 (5)	8.20 ± .432 (5)		8.92 ± .503 (5)		8.46 ± .328 (5)
WEEK 21		8.42 ± .687 (5)	8.30 ± .416 (5)		9.00 ± .491 (5)		8.58 ± .344 (5)
WEEK 22		8.16 ± .679 (5)	7.98 ± .404 (5)		9.02 ± .483 (5)		8.52 ± .348 (5)
WEEK 23		8.22 ± .670 (5)	8.08 ± .371 (5)		9.06 ± .437 (5)		8.50 ± .370 (5)
WEEK 24		8.08 ± .682 (5)	7.92 ± .315 (5)		8.92 ± .453 (5)		8.26 ± .388 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

* CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10% - A.

20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - N.

TABLE 10
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.05 MG/KG/DAY	.50 MG/KG/DAY	5.0 MG/KG/DAY	W
WEEK 1	366.0 ± 48.0 (3)	332.8 ± 13.3 (3)	371.6 ± 28.0 (3)	293.6 ± 23.7 (5)	
WEEK 2	329.2 ± 11.1 (3)	303.2 ± 3.79 (3)	350.4 ± 6.42 (3)	336.6 ± 22.0 (5)	
WEEK 3	383.0 ± 24.0 (3)	385.1 ± 7.12 (3)	359.3 ± 4.09 (3)	387.6 ± 7.62 (5)	
WEEK 4	394.9 ± 7.24 (3)	375.9 ± 8.53 (3)	378.0 ± 15.2 (3)	396.9 ± 3.08 (5)	
WEEK 5	387.8 ± 17.3 (3)	373.9 ± 11.8 (3)	395.2 ± 6.84 (3)	399.5 ± .520 (5)	
WEEK 6	389.4 ± 15.0 (3)	390.5 ± 9.37 (3)	385.4 ± 20.6 (3)	395.7 ± 4.28 (5)	
WEEK 7	390.6 ± 13.2 (3)	380.6 ± 13.8 (2)	384.3 ± 22.2 (3)	355.3 ± 44.7 (5)	
WEEK 8	393.1 ± 9.73 (3)	368.0 ± 20.4 (3)	391.7 ± 11.7 (3)	347.2 ± 52.8 (5)	
WEEK 9	392.5 ± 10.6 (3)	374.1 ± 9.27 (3)	394.8 ± 7.41 (3)	372.8 ± 27.2 (5)	
WEEK 10	391.5 ± 12.0 (3)	375.6 ± 11.2 (3)	397.6 ± 3.32 (3)	354.7 ± 45.3 (5)	
WEEK 11	391.0 ± 12.8 (3)	382.2 ± 10.8 (3)	394.2 ± 8.26 (3)	373.6 ± 26.4 (5)	
WEEK 12	395.8 ± 5.88 (3)	387.9 ± 10.5 (3)	400.0 ± .000 (3)	368.3 ± 26.2 (5)	
WEEK 13	389.6 ± 14.7 (3)	387.7 ± 4.65 (3)	398.4 ± 2.32 (3)	374.5 ± 15.7 (5)	
WEEK 14	381.6 ± 26.0 (3)	377.8 ± 7.95 (3)	382.0 ± 17.1 (3)	381.7 ± 13.2 (5)	
WEEK 15	379.1 ± 29.6 (3)	379.8 ± 7.19 (3)	380.2 ± 27.9 (3)	395.8 ± 4.20 (5)	
WEEK 16	377.5 ± 31.8 (3)	382.0 ± 7.05 (3)	396.6 ± 4.75 (3)	394.1 ± 5.92 (5)	
WEEK 17	387.1 ± 18.2 (3)	382.4 ± 15.3 (3)	400.0 ± .000 (3)	390.5 ± 9.52 (5)	
WEEK 18	379.3 ± 29.3 (3)	400.0 ± .000 (3)	400.0 ± .000 (3)	380.0 ± 20.0 (5)	
WEEK 19	376.7 ± 32.9 (3)	391.4 ± 7.41 (3)	381.9 ± 25.6 (3)	380.1 ± 13.7 (5)	
WEEK 20	363.8 ± 51.1 (3)	378.2 ± 16.0 (3)	390.0 ± 14.1 (3)	394.5 ± 5.50 (4)	
WEEK 21	383.5 ± 23.4 (3)	385.7 ± 12.4 (3)	393.7 ± 8.94 (3)	400.0 ± .000 (4)	
WEEK 22	393.8 ± 8.82 (3)	387.4 ± 10.9 (3)	400.0 ± .000 (3)	400.0 ± .000 (4)	
WEEK 23	395.6 ± 6.28 (3)	400.0 ± .000 (3)	400.0 ± .000 (3)	400.0 ± .000 (4)	
WEEK 24	400.0 ± .000 (3)	400.0 ± .000 (3)	400.0 ± .000 (3)	400.0 ± .000 (4)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 1
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.05 MG/KG/DAY		.50 MG/KG/DAY		5.0 MG/KG/DAY	
			W		W		W
WEEK 1	259.9 ± 47.3 (3)	261.0 ± 49.4 (3)		254.7 ± 44.8 (3)		248.0 ± 48.6 (3)	
WEEK 2	282.6 ± 20.1 (3)	274.4 ± 23.1 (3)		261.8 ± 16.0 (3)		266.1 ± 16.5 (3)	
WEEK 3	329.8 ± 15.8 (3)	337.1 ± 25.4 (3)		320.8 ± 20.8 (3)		292.4 ± 15.0 (3)	
WEEK 4	357.9 ± 13.8 (3)	318.9 ± 32.5 (3)		327.6 ± 18.3 (3)		330.3 ± 9.21 (3)	
WEEK 5	371.8 ± 16.5 (3)	376.4 ± 15.0 (3)		335.4 ± 22.9 (3)		305.4 ± 27.3 (3)	*
WEEK 6	373.4 ± 7.56 (3)	338.6 ± 21.7 (3)		316.4 ± 35.0 (3)		306.2 ± 21.9 (3)	
WEEK 7	377.6 ± 8.64 (3)	360.4 ± 14.6 (3)		339.5 ± 35.0 (3)		308.7 ± 33.1 (3)	
WEEK 8	346.8 ± 14.2 (3)	359.0 ± 19.6 (3)		328.1 ± 27.1 (3)		319.4 ± 16.6 (3)	
WEEK 9	360.8 ± 9.55 (3)	357.3 ± 19.1 (3)		346.9 ± 26.8 (3)		320.6 ± 16.0 (3)	
WEEK 10	347.1 ± 6.06 (3)	321.7 ± 27.9 (3)		271.2 ± 34.5 (3)		314.4 ± 23.8 (3)	
WEEK 11	357.4 ± 11.2 (3)	347.8 ± 20.3 (3)		314.1 ± 32.8 (3)		315.7 ± 14.8 (3)	
WEEK 12	356.0 ± 7.75 (3)	350.1 ± 19.9 (3)		335.0 ± 23.0 (3)		325.6 ± 30.2 (3)	
WEEK 13	359.2 ± 9.57 (3)	340.0 ± 22.2 (3)		324.4 ± 27.4 (3)		290.5 ± 13.9 (3)	*
WEEK 14	318.7 ± 16.1 (3)	320.5 ± 28.5 (3)		285.9 ± 45.3 (3)		301.9 ± 44.1 (3)	
WEEK 15	287.0 ± 22.0 (3)	340.6 ± 28.3 (3)		283.8 ± 44.2 (3)		306.0 ± 51.2 (3)	
WEEK 16	337.1 ± 18.0 (3)	377.6 ± 9.72 (3)		325.9 ± 36.1 (3)		333.3 ± 17.2 (3)	
WEEK 17	325.2 ± 3.53 (3)	328.9 ± 25.2 (3)		299.6 ± 37.2 (3)		304.1 ± 15.8 (3)	
WEEK 18	375.2 ± 11.4 (3)	368.1 ± 11.3 (3)		323.6 ± 27.0 (3)		317.1 ± 29.4 (3)	
WEEK 19	374.5 ± 61.8 (3)	363.6 ± 12.9 (3)		279.7 ± 44.0 (3)		306.2 ± 27.6 (3)	
WEEK 20	330.5 ± 17.6 (3)	373.4 ± 10.2 (3)		319.4 ± 31.4 (3)		332.3 ± 29.6 (3)	
WEEK 21	335.9 ± 33.4 (3)	346.2 ± 19.3 (3)		316.0 ± 19.6 (3)		318.4 ± 41.0 (3)	
WEEK 22	366.4 ± 20.9 (3)	363.6 ± 15.0 (3)		347.6 ± 4.64 (3)		304.4 ± 38.9 (3)	
WEEK 23	374.9 ± 12.2 (3)	386.5 ± 4.87 (3)		363.5 ± 12.1 (3)		292.9 ± 24.3 (3)	*
WEEK 24	387.1 ± 11.2 (3)	382.5 ± 7.23 (3)		360.0 ± 12.9 (3)		325.0 ± 25.5 (3)	*

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 12
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.05 MG/KG/DAY	.50 MG/KG/DAY	5.0 MG/KG/DAY	W
WEEK 1	42.5 ± 4.51 (3)	39.1 ± 2.04 (3)	42.5 ± 3.24 (3)	36.8 ± 4.15 (5)	
WEEK 2	38.0 ± .663 (3)	35.9 ± 1.23 (3)	38.4 ± .433 (3)	39.7 ± 2.51 (5)	
WEEK 3	42.8 ± 1.71 (3)	44.1 ± 2.50 (3)	38.6 ± .214 (3)	44.4 ± 3.55 (5)	
WEEK 4	43.9 ± 1.66 (3)	43.6 ± 1.05 (3)	39.8 ± .909 (3)	45.9 ± 3.63 (5)	
WEEK 5	41.2 ± 1.09 (3)	42.4 ± 3.50 (3)	41.0 ± .287 (3)	45.3 ± 3.67 (5)	
WEEK 6	40.9 ± 1.34 (3)	43.6 ± 2.46 (3)	39.3 ± 1.57 (3)	45.3 ± 3.67 (5)	
WEEK 7	40.5 ± 1.21 (3)	41.1 ± 2.93 (2)	38.8 ± 1.41 (3)	40.0 ± 6.02 (5)	
WEEK 8	41.2 ± 1.58 (3)	40.6 ± 3.93 (3)	38.9 ± .478 (3)	40.2 ± 6.73 (5)	
WEEK 9	40.3 ± 1.58 (3)	40.9 ± 2.51 (3)	38.9 ± .993 (3)	43.1 ± 4.77 (5)	
WEEK 10	39.3 ± 1.46 (3)	40.3 ± 2.66 (3)	38.4 ± 1.41 (3)	40.2 ± 5.84 (5)	
WEEK 11	38.5 ± 1.34 (3)	41.1 ± 2.45 (3)	37.9 ± .907 (3)	42.1 ± 4.44 (5)	
WEEK 12	38.8 ± 1.75 (3)	41.4 ± 1.88 (3)	38.1 ± 1.52 (3)	41.4 ± 4.31 (5)	
WEEK 13	37.8 ± 1.44 (3)	40.8 ± 1.64 (3)	37.8 ± 1.48 (3)	41.6 ± 4.28 (5)	
WEEK 14	36.6 ± 1.84 (3)	39.8 ± 1.66 (3)	36.1 ± 1.50 (3)	42.2 ± 4.72 (5)	
WEEK 15	36.3 ± 2.30 (3)	40.3 ± 1.68 (3)	35.9 ± 1.99 (3)	43.2 ± 4.24 (5)	
WEEK 16	36.4 ± 2.22 (3)	40.4 ± 1.43 (3)	37.4 ± 1.70 (3)	42.4 ± 4.01 (5)	
WEEK 17	36.8 ± 1.76 (3)	40.2 ± 1.92 (3)	37.5 ± 1.98 (3)	41.5 ± 4.10 (5)	
WEEK 18	35.9 ± 2.18 (3)	41.5 ± .706 (3)	37.1 ± 2.13 (3)	39.9 ± 4.58 (5)	
WEEK 19	35.1 ± 2.62 (3)	40.8 ± 1.10 (3)	35.5 ± 1.85 (3)	40.0 ± 4.09 (5)	
WEEK 20	33.8 ± 3.98 (3)	39.3 ± 1.70 (3)	35.7 ± 1.36 (3)	41.0 ± 4.17 (4)	
WEEK 21	36.1 ± 1.88 (3)	40.1 ± 1.31 (3)	36.5 ± 1.70 (3)	41.3 ± 3.79 (4)	
WEEK 22	37.6 ± 2.17 (3)	41.6 ± 1.15 (3)	37.8 ± 2.16 (3)	41.6 ± 3.82 (4)	
WEEK 23	37.8 ± 2.32 (3)	42.9 ± .197 (3)	37.8 ± 2.07 (3)	41.2 ± 3.74 (4)	
WEEK 24	39.6 ± 2.45 (1)	44.1 ± .558 (3)	38.8 ± 2.11 (3)	41.1 ± 3.58 (4)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 13

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE DOGS DURING 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.05 MG/KG/DAY	W	.50 MG/KG/DAY	W
WEEK 1	37.1 ± 6.20 (3)	39.2 ± 11.9 (3)	34.1 ± 4.70 (3)	35.2 ± 5.78 (3)	
WEEK 2	40.4 ± 2.92 (3)	40.3 ± 7.71 (3)	34.8 ± 1.03 (3)	37.3 ± 1.35 (3)	
WEEK 3	45.9 ± 1.86 (3)	48.6 ± 8.32 (3)	41.9 ± 1.82 (3)	40.2 ± 1.00 (3)	
WEEK 4	49.4 ± 1.62 (3)	45.9 ± 9.21 (3)	42.1 ± 2.03 (3)	45.0 ± 1.28 (3)	
WEEK 5	49.6 ± 2.13 (3)	52.4 ± 6.89 (3)	42.5 ± 3.80 (3)	40.4 ± 2.35 (3)	
WEEK 6	49.3 ± .757 (3)	46.7 ± 7.86 (3)	39.4 ± 4.21 (3)	40.5 ± 2.28 (3)	
WEEK 7	48.9 ± .311 (3)	49.4 ± 6.92 (3)	41.9 ± 3.48 (3)	40.2 ± 3.22 (3)	
WEEK 8	44.8 ± 2.18 (3)	48.9 ± 7.29 (3)	40.0 ± 4.32 (3)	41.6 ± 2.08 (3)	
WEEK 9	45.5 ± 2.44 (3)	48.0 ± 7.15 (3)	41.6 ± 3.18 (3)	40.8 ± 2.64 (3)	
WEEK 10	43.3 ± 2.60 (3)	43.3 ± 8.28 (3)	32.4 ± 4.93 (3)	39.8 ± 2.43 (3)	
WEEK 11	44.0 ± 3.48 (3)	46.2 ± 6.55 (3)	37.5 ± 4.45 (3)	39.9 ± 1.86 (3)	
WEEK 12	43.4 ± 2.89 (3)	45.6 ± 6.37 (3)	39.5 ± 4.06 (3)	39.8 ± 3.40 (3)	
WEEK 13	43.0 ± 2.62 (3)	44.1 ± 6.53 (3)	38.0 ± 4.82 (3)	35.8 ± .278 (3)	
WEEK 14	38.2 ± 3.02 (3)	42.0 ± 6.96 (3)	33.1 ± 5.56 (3)	36.8 ± 4.91 (3)	
WEEK 15	34.8 ± 4.60 (3)	41.8 ± 6.65 (3)	33.0 ± 5.79 (3)	37.2 ± 6.11 (3)	
WEEK 16	41.0 ± 4.22 (3)	48.4 ± 4.36 (3)	37.7 ± 3.57 (3)	40.7 ± 1.89 (3)	
WEEK 17	39.6 ± 1.32 (3)	42.4 ± 7.11 (3)	34.8 ± 4.60 (3)	36.8 ± .504 (3)	
WEEK 18	44.9 ± 3.54 (3)	46.2 ± 4.49 (3)	36.3 ± 3.69 (3)	37.8 ± 1.86 (3)	
WEEK 19	45.3 ± 9.90 (3)	45.3 ± 4.77 (3)	31.5 ± 4.97 (3)	36.2 ± 1.64 (3)	
WEEK 20	39.9 ± 4.08 (3)	46.2 ± 4.79 (3)	35.8 ± 2.67 (3)	39.3 ± 3.07 (3)	
WEEK 21	40.2 ± 5.23 (3)	42.4 ± 5.59 (3)	35.1 ± 1.32 (3)	37.1 ± 4.34 (3)	
WEEK 22	45.2 ± 3.94 (3)	46.2 ± 5.23 (3)	38.7 ± 1.80 (3)	35.7 ± 3.53 (3)	
WEEK 23	45.8 ± 2.78 (3)	48.2 ± 3.48 (3)	40.4 ± 2.82 (3)	34.7 ± 3.63 (3)	*
WEEK 24	48.1 ± 2.72 (3)	48.6 ± 3.14 (3)	42.7 ± .530 (3)	39.5 ± 2.87 (3)	*

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
 W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
 * CONFIDENCE LEVEL = .95

TABLE 14

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G),
ORGAN-TO-BODY WEIGHT RATIOS (G/KG) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
FINAL WEIGHT		10.26 ± .448 (5)	9.38 ± .463 (5)		10.60 ± .566 (5)		9.78 ± .718 (5)	
BRAIN		83.86 ± 1.26 (5)	84.70 ± 3.31 (5)		83.59 ± 1.51 (5)		85.48 ± 1.37 (5)	
THYROID		.75 ± .084 (5)	.96 ± .198 (5)		.92 ± .059 (5)		1.03 ± .187 (5)	
HEART		96.71 ± 1.63 (5)	94.4 ± 6.36 (5)		101.30 ± 5.71 (5)		108.61 ± 4.82 (5)	
LIVER		318.90 ± 10.4 (5)	294.19 ± 15.6 (5)		309.50 ± 10.2 (5)		329.73 ± 9.95 (5)	
SPLEEN		24.52 ± 2.44 (5)	23.67 ± 2.90 (5)		28.57 ± 2.38 (5)		29.05 ± 3.71 (5)	
ADRENAL		1.28 ± .112 (5)	1.08 ± .078 (5)		1.22 ± .083 (5)		1.28 ± .105 (5)	
KIDNEYS		52.11 ± 3.33 (5)	44.82 ± 1.46 (5)		51.56 ± 2.81 (5)		56.61 ± 3.32 (5)	
TESTES		18.53 ± 2.45 (5)	12.42 ± 1.13 (5)	A	14.22 ± 1.36 (5)		14.68 ± .866 (5)	
BRAIN/BODY		8.23 ± .353 (5)	9.16 ± .709 (5)		7.96 ± .361 (5)		8.96 ± .771 (5)	
THYROID/BODY		.07 ± .009 (5)	.10 ± .018 (5)	C	.09 ± .005 (5)	A	.10 ± .014 (5)	C
HEART/BODY		9.48 ± .306 (5)	10.07 ± .448 (5)		9.56 ± .138 (5)		11.20 ± .350 (5)	*
LIVER/BODY		31.27 ± 1.44 (5)	31.57 ± 1.89 (5)		29.38 ± 1.14 (5)		34.60 ± 3.27 (5)	
SPLEEN/BODY		2.37 ± .161 (5)	2.49 ± .196 (5)		2.72 ± .254 (5)		2.92 ± .176 (5)	
ADRENAL/BODY		.12 ± .008 (5)	.12 ± .005 (5)		.12 ± .011 (5)		.14 ± .019 (5)	
KIDNEY/BODY		5.12 ± .16 (5)	4.82 ± .268 (5)		4.89 ± .259 (5)		5.86 ± .389 (5)	
TESTES/BODY		1.80 ± .120 (5)	1.32 ± .088 (5)		1.37 ± .175 (5)		1.53 ± .126 (5)	
THYROID/BRAIN		.01 ± .001 (5)	.01 ± .002 (5)	B	.01 ± .001 (5)	B	.01 ± .002 (5)	B
HEART/BRAIN		1.15 ± .036 (5)	1.12 ± .085 (5)		1.21 ± .069 (5)		1.27 ± .070 (5)	
LIVER/BRAIN		1.81 ± .121 (5)	1.59 ± .254 (5)		3.71 ± .150 (5)		3.86 ± .091 (5)	
SPLEEN/BRAIN		.29 ± .024 (5)	.29 ± .045 (5)		.34 ± .027 (5)	A	.34 ± .046 (5)	A
ADRENAL/BRAIN		.02 ± .001 (5)	.01 ± .001 (5)	A	.01 ± .001 (5)		.01 ± .001 (5)	
KIDNEY/BRAIN		.67 ± .044 (5)	.53 ± .019 (5)	A	.62 ± .038 (5)		.66 ± .038 (5)	
TESTES/BRAIN		.22 ± .012 (5)	.15 ± .014 (5)	B	.17 ± .016 (5)	B	.17 ± .009 (5)	B

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

† CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10% - A,
20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 15

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G),
ORGAN-TO-BODY WEIGHT RATIOS (G/KG) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R
FINAL WEIGHT			8.34 ± .674 (5)		8.94 ± .406 (5)	8.50 ± .456 (5)
BRAIN			80.57 ± 1.76 (5)		81.06 ± 2.09 (5)	78.67 ± 2.50 (5)
THYROID			.83 ± .059 (5)		.81 ± .112 (5)	.84 ± .101 (5)
HEART			78.94 ± 3.37 (5)		83.32 ± 4.49 (5)	83.46 ± 5.28 (5)
LIVER			287.16 ± 15.7 (5)		273.94 ± 18.1 (5)	295.25 ± 10.3 (5)
SPLEEN			22.87 ± 2.28 (5)		23.78 ± 2.25 (5)	31.18 ± 1.60 (5)
ADRENAL			1.25 ± .072 (5)		1.30 ± .128 (5)	1.28 ± .097 (5)
KIDNEYS			38.32 ± 1.30 (5)		38.08 ± 1.63 (5)	36.66 ± 1.89 (5)
GONADS			1.04 ± .131 (5)		1.51 ± .276 (5)	1.08 ± .118 (5)
BRAIN/BODY			9.89 ± .648 (5)		9.17 ± .598 (5)	9.34 ± .504 (5)
THYROID/BODY			.10 ± .014 (5)		.09 ± .014 (5)	.10 ± .007 (5)
HEART/BODY			9.64 ± .549 (5)		9.33 ± .346 (5)	9.85 ± .550 (5)
LIVER/BODY			35.33 ± 3.18 (5)		30.69 ± 1.63 (5)	35.18 ± 2.43 (5)
SPLEEN/BODY			2.76 ± .214 (5)		2.63 ± .192 (5)	3.70 ± .240 (5)
ADRENAL/BODY			.15 ± .011 (5)		.15 ± .016 (5)	.15 ± .010 (5)
KIDNEY/BODY			4.68 ± .269 (5)		4.27 ± .088 (5)	4.34 ± .221 (5)
GONADS/BODY			.13 ± .014 (5)	A	.17 ± .026 (5)	.13 ± .011 (5)
THYROID/BRAIN			.01 ± .001 (5)		.01 ± .002 (5)	.01 ± .001 (5)
HEART/BRAIN			.98 ± .042 (5)		1.03 ± .055 (5)	1.06 ± .065 (5)
LIVER/BRAIN			3.58 ± .242 (5)		3.38 ± .204 (5)	3.78 ± .215 (5)
SPLEEN/BRAIN			.28 ± .026 (5)		.30 ± .032 (5)	.40 ± .029 (5)
ADRENAL/BRAIN			.02 ± .001 (5)		.02 ± .002 (5)	.02 ± .001 (5)
KIDNEY/BRAIN			.48 ± .017 (5)		.47 ± .025 (5)	.47 ± .028 (5)
GONADS/BRAIN			.01 ± .002 (5)	B	.02 ± .003 (5)	.01 ± .001 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

* CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10% - A,
20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - X.

Hematology

Hematology results before and after 8 weeks of treatment are given in Tables 16 through 19. An appreciable decrease in the RBC, hemoglobin, and hematocrit of both sexes occurred at the highest dose level after 8 weeks (Tables 18 and 19). Only in the case of hemoglobin values in males, however, was the difference significant ($p < 0.05$); all other values were in the normal range. Reticulocytes were significantly elevated in the males (and tended to be high in females) at the high dose level; this finding is consistent with the interpretation that these dogs were in a compensated anemic state. The treatment may also have affected males receiving the intermediate dose level (e.g., low hematocrit), but this cannot be established with certainty because of the small group size. The slightly elevated reticulocyte levels in females receiving the low dose was characteristic of this group before the study and probably has no bearing on the treatment. The relatively low atypical lymphocyte mean can be disregarded for the same reason.

Tables 20 and 21 give hematology data for dogs after 17 weeks of treatment. Dogs at the 5.0-mg/kg/day level continued to show a mild anemia, as reflected in lower RBC, Hgb, and Hct values compared with controls (significantly lower for females). Mean corpuscular volume was significantly elevated for females, but this value was only marginally high compared with the normal range of values for MCV in the dog. At the 0.05-mg/kg/day level, band cells of females were significantly high and the white blood cell count was also high (though not significantly) relative to other groups. These dogs showed no outward signs of being ill. Because no obvious dose relationship was found with this increase in leukocyte counts, its occurrence was tentatively attributed to a mild viral infection in one or more dogs and not to the treatment.

After 24 weeks of treatment (Tables 22 and 23) signs of anemia in the treated dogs were almost nonexistent. Only male MCHC at the 5.0-mg/kg/day level and reticulocytes at the 0.5-mg/kg/day level were significantly altered. Reticulocytes of other treatment groups at the 0.5- and 5.0-mg/kg/day level were noticeably higher than in controls, but none of these values are excessive. The high leukocyte count for females at the 0.05-mg/kg/day level noted at 17 weeks had returned to a more normal value.

Clinical Chemistry

Tables 24 through 31 present the clinical chemistry data. After 8 weeks of treatment (Tables 26 and 27), high-dose males showed significantly low glucose and phosphorus; females also had low glucose (not statistically significant) and phosphorus (at the intermediate dose as well). Both sexes at the highest level had lower blood calcium levels and increased LDH compared with their respective control groups

TABLE 16

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE DOGS BEFORE STARTING TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
RBC (X 10 ⁶)		5.47 ± .237 (5)	5.54 ± .151 (5)		6.03 ± .272 (5)		6.27 ± .477 (5)
HGB (G %)		13.54 ± .496 (5)	13.98 ± .354 (5)		14.52 ± .449 (5)		14.00 ± .818 (5)
HCT (%)		37.40 ± 1.54 (5)	38.20 ± 1.11 (5)		41.40 ± 2.04 (5)		42.40 ± 3.22 (5)
MCV (U) ³		69.00 ± .447 (5)	69.60 ± .678 (5)		69.60 ± 1.08 (5)		70.00 ± .633 (5)
MCH (UDG)		25.20 ± .490 (5)	26.20 ± .374 (5)		24.60 ± .678 (5)		22.60 ± .812 (5)
MCHC (%)		37.00 ± .447 (5)	37.40 ± .678 (5)		36.00 ± 1.30 (5)		33.40 ± .927 (5)
WBC (X 10 ³)		10.14 ± .833 (5)	11.62 ± .738 (5)		12.64 ± .916 (5)		10.86 ± 1.14 (5)
PMN (%)	*	54.60 ± .600 (5)	58.00 ± 2.55 (5)		58.00 ± 2.76 (5)		56.00 ± 1.26 (5)
BANDS (%)		1.00 ± .316 (5)	1.40 ± .245 (5)		1.40 ± .400 (5)		1.20 ± .200 (5)
LYMPH (%)	*	32.00 ± 1.30 (5)	28.60 ± 2.89 (5)		32.00 ± 4.66 (5)		33.20 ± 1.16 (5)
ATYP LYMPH(%)		2.20 ± .200 (5)	1.60 ± .510 (5)		.40 ± .400 (5)	* C	1.20 ± .374 (5)
MONO (%)		5.40 ± .245 (5)	6.40 ± .400 (5)		4.80 ± .374 (5)		4.40 ± .678 (5)
EOSIN (%)		4.80 ± .583 (5)	4.00 ± .775 (5)		3.60 ± 1.47 (5)		4.00 ± .837 (5)
BASO (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)
RETICS (%)		1.02 ± .150 (5)	.90 ± .118 (5)		1.06 ± .154 (5)		.90 ± .118 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%

B - 20%, C - 35%, AND E - 50%. X = RATIO TEST CANNOT BE CALCULATED.

TABLE 17

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE DOGS BEFORE STARTING TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
RBC (X 10 ⁶)	*	5.81 ± .253 (5)	5.71 ± .109 (5)		5.54 ± .129 (5)		6.32 ± .452 (5)	
HGB (G %)		14.56 ± .546 (5)	14.14 ± .379 (5)		13.66 ± .160 (5)		14.40 ± .302 (5)	
HCT (%)	*	39.80 ± 1.59 (5)	39.00 ± .949 (5)		37.60 ± .600 (5)		44.20 ± 3.09 (5)	
MCV (U)3		69.00 ± 1.14 (5)	69.00 ± 0.00 (5)		69.00 ± .949 (5)		70.40 ± .400 (5)	
MCH (UUG)	*	27.60 ± 2.42 (5)	25.00 ± .316 (5)		24.60 ± .510 (5)		23.20 ± 1.32 (5)	
MCHC (%)	+	35.20 ± 2.40 (5)	36.60 ± .245 (5)		36.20 ± .490 (5)		32.80 ± 1.77 (5)	
WBC (X 10 ³)		10.16 ± .930 (5)	11.82 ± 1.25 (5)		10.35 ± 1.03 (5)		11.86 ± 1.56 (5)	
PMN (%)		53.60 ± 2.25 (5)	64.20 ± 2.18 (5)		56.00 ± 1.92 (5)		56.60 ± 3.74 (5)	
BANDS (%)		1.00 ± .316 (5)	1.60 ± .400 (5)		.40 ± .245 (5)		1.60 ± .600 (5)	
LYMPH (%)		31.20 ± 2.03 (5)	23.60 ± 1.75 (5)		35.20 ± 1.74 (5)		32.20 ± 3.89 (5)	
ATYP LYMPH(Z)		3.00 ± .894 (5)	.80 ± .490 (5)	B	.40 ± .400 (5)	* C	.40 ± .400 (5)	* C
MONO (%)		5.20 ± .663 (5)	6.40 ± .510 (5)		4.40 ± .510 (5)		4.80 ± .374 (5)	
EOSIN (%)		6.00 ± 1.22 (5)	3.40 ± 1.25 (5)		3.60 ± .872 (5)		4.40 ± .678 (5)	
BASO (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	
RETICS (%)		1.14 ± .117 (5)	1.38 ± .258 (5)		1.24 ± .279 (5)		1.04 ± .163 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST ; R = TREATMENT-CONTROL RATIO TEST
R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%
B - 20%, C - 35%, AND E - 50%. X = RATIO TEST CANNOT BE CALCULATED.

TABLE 18

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE DOGS AFTER 8 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
RBC (X 10 ⁶)		6.05 ± .294 (5)	6.17 ± .254 (5)		5.70 ± .103 (5)		5.31 ± .292 (5)	
HGB (G %)		14.36 ± .464 (5)	14.76 ± .268 (5)		14.18 ± .435 (5)		12.42 ± .451 (5)	*
HCT (%)		41.80 ± 2.18 (5)	42.20 ± 1.83 (5)		38.80 ± .860 (5)		37.20 ± 2.18 (5)	
MCV (U)3		71.20 ± 1.32 (5)	69.00 ± .548 (5)		69.40 ± 1.21 (5)		71.00 ± 1.14 (5)	
MCH (UUG)		23.80 ± .735 (5)	24.40 ± .927 (5)		25.00 ± .548 (5)		23.80 ± .800 (5)	
MCHC (%)		34.80 ± .970 (5)	36.00 ± 1.30 (5)		36.80 ± .374 (5)		34.00 ± 1.38 (5)	
WBC (X 10 ³)		12.22 ± .701 (5)	14.28 ± .967 (5)		12.68 ± .388 (5)		11.86 ± 1.44 (5)	
PMN (%)	*	58.20 ± 2.67 (5)	59.20 ± .663 (5)		59.60 ± 1.03 (5)		60.00 ± 2.74 (5)	
BANDS (%)		1.40 ± .245 (5)	2.40 ± .245 (5)		2.00 ± .316 (5)		1.80 ± .663 (5)	
LYMPH (%)		24.80 ± 1.85 (5)	24.00 ± 1.14 (5)		23.80 ± 1.83 (5)		24.00 ± 1.87 (5)	
ATYP LYMPH(%)	*	1.20 ± .490 (5)	2.20 ± .200 (5)	X	1.20 ± .374 (5)	X	1.40 ± .927 (5)	X
MONO (%)		6.00 ± .548 (5)	5.80 ± .800 (5)		5.80 ± .374 (5)		5.60 ± .245 (5)	
E-OSIN (%)		8.40 ± .678 (5)	6.40 ± .510 (5)		7.60 ± 1.29 (5)		7.20 ± 1.11 (5)	
BASO (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	
RETICS (%)	*	1.66 ± .417 (5)	1.34 ± .103 (5)		1.32 ± .186 (5)		3.62 ± .622 (5)	*

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

HC = HARRIS' CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

K = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%.

B - 20%, C - 35%, AND E - 50%. X = RATIO TEST CANNOT BE CALCULATED.

TABLE 19

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE DOGS AFTER 8 WEEKS OF TREATMENT

DEPENDENT VARIABLE	S C	CONTROL GROUP	TREATMENT GROUPS				
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
RBC (X 10 ⁶)		6.11 ± .172 (5)	6.28 ± .257 (5)		5.93 ± .190 (5)		5.55 ± .144 (5)
HGB (G Z)		14.86 ± .370 (5)	14.68 ± .470 (5)		14.24 ± .236 (5)		13.44 ± .346 (5)
HCT (Z)		41.20 ± .970 (5)	42.40 ± 2.06 (5)		40.20 ± 1.07 (5)		38.60 ± .927 (5)
MCV (U) ³		68.20 ± .735 (5)	68.20 ± .374 (5)		69.20 ± 1.20 (5)		70.80 ± .374 (5)
MCH (UUG)		24.40 ± .400 (5)	23.60 ± .678 (5)		24.40 ± .927 (5)		24.40 ± .400 (5)
MCHC (Z)		36.00 ± .548 (5)	35.20 ± 1.07 (5)		36.20 ± .916 (5)		34.60 ± .510 (5)
WBC (X 10 ³)	*	12.60 ± .335 (5)	13.66 ± 2.04 (5)		11.34 ± .627 (5)		13.06 ± 1.62 (5)
PMN (Z)		57.00 ± 1.41 (5)	63.60 ± 2.60 (5)		58.00 ± 2.77 (5)		60.40 ± 3.89 (5)
BANDS (Z)		2.00 ± .316 (5)	2.40 ± .400 (5)		1.20 ± .374 (5)		2.40 ± .510 (5)
LYMPH (Z)		24.60 ± 1.72 (5)	21.00 ± 2.57 (5)		27.60 ± 2.69 (5)		21.40 ± 2.23 (5)
ATYP LYMPH(Z)		2.60 ± .400 (5)	.60 ± .400 (5)	B	1.20 ± .800 (5)		2.00 ± .894 (5)
MONO (Z)		6.00 ± .548 (5)	6.60 ± .400 (5)		6.00 ± .316 (5)		5.40 ± .678 (5)
EOSIN (Z)		7.80 ± 1.02 (5)	5.80 ± .663 (5)		6.00 ± .548 (5)		8.40 ± 1.50 (5)
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)
RETICS (Z)	*	1.24 ± .238 (5)	1.94 ± .060 (5)	*	1.32 ± .174 (5)		2.12 ± .463 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%,

B - 20%, C - 35%, AND E - 50%.

TABLE 20

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE DOGS AFTER 17 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
RBC (X 10 ⁶)		6.08 ± .191 (5)	6.39 ± .468 (4)		6.46 ± .285 (2)		5.39 ± .115 (5)
HGB (G Z)		15.00 ± .487 (5)	14.38 ± .149 (4)		15.40 ± 1.50 (2)		13.32 ± .357 (5)
HCT (Z)		42.20 ± 1.71 (5)	43.25 ± 2.59 (4)		46.00 ± 1.00 (2)		38.40 ± .980 (5)
MCV (U)3		69.40 ± .927 (5)	68.00 ± 1.68 (4)		72.50 ± 4.50 (2)		71.40 ± .400 (5)
MCH (UUG)		24.58 ± .364 (5)	22.60 ± 1.60 (4)		24.00 ± 1.00 (2)		24.00 ± .447 (5)
MCHC (Z)		35.66 ± .829 (5)	33.30 ± 2.00 (4)		34.00 ± 4.00 (2)		34.80 ± .735 (5)
WBC (X 10 ³)		14.50 ± 1.15 (5)	15.52 ± 1.95 (4)		12.95 ± .750 (2)		12.72 ± 1.03 (5)
PMN (Z)		65.20 ± 5.23 (5)	67.25 ± 3.12 (4)		60.50 ± 1.50 (2)		59.40 ± 2.71 (5)
BANDS (Z)		.80 ± .374 (5)	3.50 ± .866 (4)	x	3.00 ± 0.00 (2)	x	3.20 ± 1.16 (5)
LYMPH (Z)		20.80 ± 4.43 (5)	18.00 ± 2.58 (4)		23.50 ± .500 (2)		24.80 ± 2.69 (5)
ATYP LYMPH(Z)		2.60 ± .812 (5)	1.50 ± .289 (4)		.50 ± .500 (2)		2.80 ± .860 (5)
MONO (Z)		3.60 ± .748 (5)	4.25 ± 1.55 (4)		4.00 ± 1.00 (2)		1.60 ± .510 (5)
EOSIN (Z)		6.80 ± .583 (5)	5.50 ± .289 (4)		8.50 ± .500 (2)		8.20 ± 1.16 (5)
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (4)		0.00 ± 0.00 (2)		0.00 ± 0.00 (5)
RETICS (Z)		.48 ± .136 (5)	.50 ± .173 (4)		.10 ± .100 (2)		.56 ± .040 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 21

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE DOGS AFTER 17 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS						T R
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R	
RBC (X 10 ⁶)		6.48 ± .363 (4)	5.84 ± .132 (5)		6.11 ± .133 (5)		5.24 ± .082 (5)		+ A
HGB (G %)		15.02 ± .582 (4)	14.40 ± .473 (5)		14.94 ± .371 (5)		12.88 ± .196 (5)		*
HCT (%)		43.50 ± 2.40 (4)	39.80 ± .970 (5)		42.20 ± 1.16 (5)		37.20 ± .583 (5)		*
MCV (U) ³		67.50 ± .866 (4)	68.80 ± .916 (5)		69.40 ± 1.12 (5)		71.80 ± .735 (5)		*
MCH (UUG)		23.02 ± .761 (4)	24.30 ± .467 (5)		24.40 ± .400 (5)		24.60 ± .400 (5)		
MCHC (%)		34.62 ± 1.40 (4)	35.66 ± .835 (5)		35.80 ± .374 (5)		34.20 ± .583 (5)		
WBC (X 10 ³)		14.12 ± 1.46 (4)	19.16 ± 2.58 (5)		13.54 ± 1.33 (5)		13.91 ± 1.95 (5)		
PMN (%)		64.50 ± 4.09 (4)	66.80 ± 3.31 (5)		63.40 ± 2.79 (5)		64.60 ± 2.98 (5)		
BANDS (%)		.50 ± .500 (4)	4.00 ± .633 (5)	+ *	1.80 ± .583 (5)	*	2.20 ± .374 (5)	*	x
LYMPH (%)		19.50 ± 2.40 (4)	17.40 ± 2.60 (5)		25.00 ± 2.49 (5)		23.40 ± 2.11 (5)		
ATYP LYMPH(%)		2.50 ± .289 (4)	2.40 ± .510 (5)		1.00 ± .316 (5)	A	1.60 ± .678 (5)		
MONO (%)		2.75 ± 1.75 (4)	3.80 ± .970 (5)		2.40 ± 1.03 (5)		1.40 ± .927 (5)		
EOSIN (%)		9.75 ± 2.29 (4)	5.40 ± 1.57 (5)		6.40 ± 2.16 (5)		6.40 ± 1.29 (5)		
BASO (%)		0.00 ± 0.00 (4)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		
RETICS (%)		.30 ± .100 (4)	.32 ± .120 (5)		.36 ± .098 (5)		.52 ± .080 (5)		

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 22
EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
RBC (X 10 ⁶)		6.43 ± .170 (5)	6.30 ± .073 (5)		6.77 ± .165 (5)		5.91 ± .159 (5)
HGB (G Z)		16.18 ± .484 (5)	15.94 ± .191 (5)		16.86 ± .443 (5)		14.88 ± .545 (5)
HCT (Z)		43.80 ± 1.16 (5)	42.60 ± .510 (5)		46.60 ± 1.54 (5)		41.80 ± 1.36 (5)
MCV (U) ³		68.80 ± .200 (5)	68.00 ± .707 (5)		69.00 ± 1.05 (5)		70.80 ± .735 (5)
MCH (UUG)		25.00 ± .316 (5)	26.00 ± .447 (5)		24.20 ± .490 (5)		24.80 ± .374 (5)
MCHC (Z)		37.00 ± .447 (5)	38.00 ± .447 (5)		35.40 ± .245 (5)		35.00 ± .316 (5) *
WBC (X 10 ³)		11.28 ± .570 (5)	13.06 ± 1.10 (5)		10.90 ± .640 (5)		10.98 ± 1.30 (5)
PMN (Z)		56.80 ± 2.63 (5)	58.80 ± 3.06 (5)		52.40 ± 2.71 (5)		58.00 ± 4.11 (5)
BANDS (Z)		3.00 ± .707 (5)	1.80 ± .583 (5)		2.80 ± .583 (5)		1.80 ± .663 (5)
LYMPH (Z)		30.60 ± 1.40 (5)	30.00 ± 2.07 (5)		33.60 ± 2.98 (5)		28.60 ± 3.08 (5)
ATYP LYMPH(Z)		3.00 ± .447 (5)	2.40 ± .245 (5)		1.60 ± .400 (5)	A	1.80 ± .374 (5)
MONO (Z)		1.60 ± .510 (5)	1.20 ± .200 (5)		1.60 ± .400 (5)		2.20 ± .583 (5)
EOSIN (Z)		5.00 ± .633 (5)	5.80 ± 1.53 (5)		8.00 ± 1.30 (5)		7.60 ± 1.72 (5)
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)
RETICS (Z)	*	1.08 ± .287 (5)	.52 ± .177 (5)		2.32 ± .422 (5)	*	3.00 ± .767 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 23

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			T	R	T	R
RBC (X 106)		6.44 ± .174 (5)	6.00 ± .118 (5)	6.06 ± .127 (5)	5.90 ± .201 (5)	
HGB (G Z)		15.86 ± .388 (5)	15.06 ± .457 (5)	14.82 ± .373 (5)	15.08 ± .191 (5)	
HCT (Z)		43.00 ± 1.26 (5)	39.60 ± .678 (5)	41.00 ± .949 (5)	40.60 ± 1.17 (5)	
MCV (U)3		67.40 ± .748 (5)	67.00 ± .316 (5)	68.20 ± 1.16 (5)	69.20 ± .583 (5)	
MCH (UUG)		25.00 ± .447 (5)	25.40 ± .400 (5)	24.80 ± .490 (5)	25.20 ± .800 (5)	
MCHC (Z)		37.20 ± .735 (5)	38.40 ± .600 (5)	35.80 ± .583 (5)	37.00 ± .775 (5)	
WBC (X 103)		11.72 ± .594 (5)	14.30 ± 1.11 (5)	11.20 ± 1.28 (5)	12.96 ± 1.18 (5)	
PMN (Z)		59.40 ± 3.01 (5)	64.20 ± 1.32 (5)	59.40 ± 3.94 (5)	64.20 ± 4.10 (5)	
BANDS (Z)		1.40 ± .510 (5)	2.00 ± 1.14 (5)	2.20 ± .583 (5)	3.00 ± .633 (5)	x
LYMPH (Z)		27.40 ± 3.16 (5)	24.20 ± 3.26 (5)	30.80 ± 3.48 (5)	25.00 ± 4.21 (5)	
ATYP LYMPH(Z)		1.80 ± .490 (5)	2.60 ± .510 (5)	1.20 ± .374 (5)	1.60 ± .245 (5)	
MONO (Z)		1.80 ± .374 (5)	1.80 ± .490 (5)	1.60 ± .245 (5)	1.40 ± .400 (5)	
EOSIN (Z)		8.20 ± 1.07 (5)	5.20 ± 1.69 (5)	4.80 ± 1.53 (5)	4.80 ± 1.02 (5)	
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)	0.00 ± 0.00 (5)	0.00 ± 0.00 (5)	
RETICS (Z)		1.12 ± .280 (5)	.86 ± .218 (5)	2.14 ± .638 (5)	2.76 ± .564 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 24

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS BEFORE STARTING TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
ALBUMIN (GMZ)		3.98 ± .146 (5)	4.02 ± .124 (5)		3.90 ± .100 (5)		4.04 ± .166 (5)	
ALK-P (IU/L)		93.00 ± 15.2 (5)	119.80 ± 31.8 (5)		104.00 ± 18.9 (5)		80.00 ± 9.01 (5)	
BUN (MG Z)	*	16.40 ± .980 (5)	14.80 ± 2.82 (5)		11.60 ± 1.17 (5)	*	10.20 ± .583 (5)	+ B
CA (MG Z)	*	12.60 ± .100 (5)	12.44 ± .068 (5)		12.60 ± .247 (5)		12.68 ± .271 (5)	
CHOL (MG Z)		200.40 ± 6.52 (5)	178.60 ± 11.5 (5)		161.80 ± 19.3 (5)		186.60 ± 22.2 (5)	
CREAT (MG Z)		.84 ± .024 (5)	.72 ± .049 (5)	A	.76 ± .040 (5)		.80 ± .055 (5)	
GLUCOSE (MGZ)		96.60 ± 5.71 (5)	103.60 ± 4.82 (5)		94.00 ± 2.83 (5)		108.20 ± 3.50 (5)	
P (MG Z)		9.54 ± .389 (5)	10.40 ± .666 (5)		11.00 ± .844 (5)		11.64 ± .939 (5)	
LDH (IU/L)	*	93.20 ± 28.7 (5)	47.80 ± 14.6 (5)		55.80 ± 7.63 (5)		70.80 ± 36.4 (5)	
TRIG (MG Z)	+	77.40 ± 6.96 (5)	76.00 ± 11.1 (5)		56.80 ± 4.53 (5)	*	46.40 ± .600 (5)	* B
URIC ACID(MGZ)		1.10 ± .084 (5)	1.36 ± .081 (5)		1.32 ± .058 (5)		1.16 ± .093 (5)	
PROTEIN (MGZ)		5.50 ± .187 (5)	5.50 ± .158 (5)		5.58 ± .150 (5)		5.60 ± .158 (5)	
SGPT (IU/L)		22.20 ± 1.98 (5)	22.40 ± 1.54 (5)		26.00 ± 1.45 (5)		22.80 ± 2.35 (5)	
SGOT(IU/L)		26.40 ± 1.96 (5)	30.60 ± 2.58 (5)		28.40 ± 4.21 (5)		23.40 ± 2.25 (5)	
BILI (MG Z)		.77 ± .052 (4)	.50 ± .049 (5)	* A	.52 ± .059 (5)	* A	.59 ± .043 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE

T = TREATMENT-CONTROL CONTRAST ; R = TREATMENT-CONTROL RATIO TEST

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%

B - 20%, C - 35%, AND E - 50%.

TABLE 25

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE DOGS BEFORE STARTING TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
ALBUMIN (G%)		4.18 ± .107 (5)	4.04 ± .140 (5)		3.94 ± .117 (5)		3.92 ± .136 (5)	
ALK-P (IU/L)		89.00 ± 6.75 (5)	84.20 ± 3.87 (5)		91.00 ± 7.19 (5)		82.00 ± 4.97 (5)	
BUN (MG %)		18.80 ± 1.02 (5)	15.60 ± 1.83 (5)		11.00 ± .894 (5)	+ B	13.80 ± 1.16 (5)	
CA (MG %)		12.12 ± .208 (5)	12.10 ± .210 (5)		12.28 ± .278 (5)		12.68 ± .459 (5)	
CHOL (MG %)	*	172.80 ± 17.7 (5)	189.20 ± 18.6 (5)		162.00 ± 4.96 (5)		169.80 ± 29.1 (5)	
CREAT (MG %)		.80 ± .045 (5)	.72 ± .037 (5)		.68 ± .049 (5)		.74 ± .051 (5)	
GLUCOSE (MG%)		91.40 ± 4.97 (5)	88.80 ± 6.34 (5)		104.00 ± 2.68 (5)		101.80 ± 4.59 (5)	
P (MG %)	*	9.50 ± .733 (5)	10.00 ± .702 (5)		10.52 ± .128 (5)		11.10 ± 1.08 (5)	
LDH (IU/L)	*	47.40 ± 6.49 (5)	76.00 ± 19.3 (5)		40.60 ± 6.86 (5)		30.40 ± 3.85 (5)	
TRIG (MG %)		53.60 ± 5.53 (5)	58.80 ± 7.64 (5)		43.80 ± 3.92 (5)		46.60 ± 2.89 (5)	
URIC ACID(MG%)		1.18 ± .124 (5)	1.28 ± .097 (5)		1.28 ± .066 (5)		1.20 ± .084 (5)	
PROTEIN (MG%)		5.30 ± .084 (5)	5.40 ± .130 (5)		5.36 ± .108 (5)		5.30 ± .141 (5)	
SGPT (IU/L)		22.40 ± 2.68 (5)	23.60 ± 1.17 (5)		22.00 ± 2.90 (5)		23.00 ± 1.22 (5)	
SGOT(IU/L)	*	31.80 ± 4.49 (5)	35.40 ± 1.81 (5)		28.00 ± 3.56 (5)		27.40 ± .400 (5)	
BILI (MG %)		.73 ± .076 (5)	.44 ± .042 (5)	+ B	.61 ± .029 (5)		.53 ± .033 (5)	A

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST ; R = TREATMENT-CONTROL RATIO TEST

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%

B - 20%, C - 35%, AND E - 50%.

TABLE 26

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS AFTER 8 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS						T R
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R	
ALBUMIN (GM%)		3.78 ± .102 (5)	3.48 ± .204 (5)		3.40 ± .230 (5)		3.80 ± .105 (5)		
ALK-P (IU/L)		66.00 ± 12.0 (5)	85.60 ± 17.6 (5)		71.20 ± 12.9 (5)		75.00 ± 9.62 (5)		
BUN (MG %)		15.00 ± 1.10 (5)	15.60 ± .927 (5)		13.80 ± 1.02 (5)		16.80 ± 2.60 (5)		
CA (MG %)		10.10 ± .378 (5)	10.20 ± .200 (5)		9.78 ± .193 (5)		8.96 ± .371 (5)		
CHOL (MG %)		159.80 ± 7.00 (5)	154.20 ± 12.3 (5)		134.40 ± 12.4 (5)		161.00 ± 11.9 (5)		
CREAT (MG %)	+	.90 ± .055 (5)	1.10 ± .277 (5)		.84 ± .024 (5)		.78 ± .037 (5)		
GLUCOSE (MG%)		109.80 ± 1.77 (5)	104.20 ± 2.20 (5)		103.40 ± 5.49 (5)		88.40 ± 4.17 (5)		+ A
P (MG %)		12.80 ± 1.11 (5)	9.26 ± 1.51 (5)		8.92 ± .982 (5)		7.52 ± .541 (5)		+ B
LDH (IU/L)	+	26.00 ± 1.18 (5)	28.60 ± .872 (5)		24.60 ± 4.33 (5)		74.40 ± 18.1 (5)		
TRIG (MG %)		43.80 ± 6.76 (5)	36.40 ± 5.61 (5)		44.40 ± 5.30 (5)		39.40 ± 3.80 (5)		
URIC ACID(MG%)		.86 ± .075 (5)	.86 ± .040 (5)		.80 ± .130 (5)		.78 ± .074 (5)		
PROTEIN (MG%)		5.54 ± .112 (5)	5.60 ± .170 (5)		5.40 ± .192 (5)		5.08 ± .237 (5)		
SGPT (IU/L)		24.00 ± 1.38 (5)	27.20 ± 2.96 (5)		31.40 ± 1.91 (5)		27.20 ± 3.67 (5)		
SGOT(IU/L)		26.60 ± 2.75 (5)	29.40 ± 2.87 (5)		24.00 ± 2.43 (5)		25.80 ± 1.77 (5)		
BILI (MG %)		.48 ± .045 (5)	.46 ± .040 (5)		.49 ± .047 (5)		.49 ± .059 (5)		

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%,
B - 20%, C - 35%, AND E - 50%.

TABLE 27

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE DOGS AFTER 8 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R
ALBUMIN (MG%)	*	3.84 ± .060 (5)	3.42 ± .120 (5)	*	3.60 ± .187 (5)		3.66 ± .286 (5)	
ALK-P (IU/L)	*	87.40 ± 20.0 (5)	74.20 ± 5.67 (5)		65.00 ± 4.91 (5)		71.60 ± 8.41 (5)	
BUN (MG %)		18.40 ± 1.60 (5)	17.60 ± 1.96 (5)		14.80 ± 1.20 (5)		14.80 ± .916 (5)	
CA (MG %)		9.84 ± .457 (5)	9.94 ± .269 (5)		10.00 ± .241 (5)		8.48 ± .183 (5)	*
CHOL (MG %)		162.00 ± 23.5 (5)	171.00 ± 15.2 (5)		138.20 ± 10.0 (5)		166.40 ± 20.4 (5)	
CREAT (MG %)		.90 ± .032 (5)	.88 ± .066 (5)		.78 ± .037 (5)		.70 ± .045 (5)	
GLUCOSE (MG%)		95.20 ± 5.56 (5)	98.80 ± 2.78 (5)		105.00 ± 3.18 (5)		87.00 ± 3.94 (5)	
P (MG %)		12.12 ± .671 (5)	9.32 ± .691 (5)		8.10 ± 1.05 (5)	* A	8.32 ± .830 (5)	* A
LDH (IU/L)	*	24.80 ± 1.36 (5)	26.40 ± 1.86 (5)		29.00 ± 4.87 (5)		64.20 ± 8.97 (5)	* D
TRIG (MG %)		37.80 ± 7.15 (5)	71.40 ± 8.38 (5)	*	39.60 ± 2.36 (5)		45.20 ± 7.08 (5)	
URIC ACID(MG%)		.72 ± .049 (5)	.96 ± .129 (5)		.72 ± .107 (5)		1.00 ± .089 (5)	
PROTEIN (MG%)		5.48 ± .186 (5)	5.52 ± .235 (5)		5.40 ± .230 (5)		5.26 ± .231 (5)	
SGPT (IU/L)		24.60 ± 1.25 (5)	25.60 ± 1.29 (5)		25.00 ± 2.32 (5)		25.20 ± 1.74 (5)	
SGOT(IU/L)		27.00 ± 1.52 (5)	28.80 ± 2.03 (5)		25.80 ± 2.56 (5)		30.80 ± .970 (5)	
BILI (MG %)		.57 ± .034 (5)	.52 ± .025 (5)		.46 ± .042 (5)	A	.48 ± .060 (5)	A

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CI GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST A - 10%,

B - 20%, C - 35%, AND E - 50%.

TABLE 28

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS AFTER 17 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R
ALBUMIN (GMZ)		3.48 ± .037 (5)	3.38 ± .116 (5)		2.92 ± .058 (5)	+ A
ALK-P (IU/L)		60.80 ± 15.3 (5)	92.40 ± 8.73 (5)		77.00 ± 14.4 (5)	
BUN (MG Z)	*	12.40 ± .600 (5)	15.00 ± 1.87 (5)		12.60 ± .510 (5)	
CA (MG Z)		10.98 ± .426 (5)	10.22 ± .235 (5)		9.62 ± .132 (5)	*
CHOL (MG Z)		143.60 ± 8.00 (5)	134.80 ± 14.4 (5)		127.60 ± 14.6 (5)	
CREAT (MG Z)		.84 ± .093 (5)	.80 ± .032 (5)		.72 ± .037 (5)	
GLUCOSE (MGZ)		99.40 ± 2.80 (5)	99.80 ± 4.02 (5)		81.40 ± 2.86 (5)	*
P (MG Z)	+	7.78 ± 1.29 (5)	4.52 ± .097 (5)	A	4.62 ± .150 (5)	A
LDH (IU/L)	+	73.00 ± 12.9 (5)	68.60 ± 13.4 (5)		66.00 ± 4.83 (5)	
TRIG (MG Z)		44.80 ± 2.97 (5)	41.80 ± 7.55 (5)		43.80 ± 5.97 (5)	
URIC ACID(MGZ)		1.18 ± .097 (5)	.88 ± .074 (5)	* A	.56 ± .040 (5)	+ C
PROTEIN (GMZ)	*	7.02 ± .329 (5)	6.18 ± .111 (5)		5.50 ± .141 (5)	* A
SGPT (IU/L)		30.20 ± 2.03 (5)	33.00 ± 5.79 (5)		36.40 ± 1.78 (5)	
SGOT(IU/L)		29.60 ± .980 (5)	34.40 ± 2.58 (5)		34.40 ± 1.21 (5)	
BILI (MG Z)		.10 ± .032 (5)	.10 ± .032 (5)		.08 ± .020 (5)	B
					.18 ± .020 (5)	D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 29

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE DOGS AFTER 17 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.05 MG/KG/DAY		.5 MG/KG/DAY		5.0 MG/KG/DAY	
				T R		T R		T R
ALBUMIN (GM%)	*	3.44 ± .040 (5)	3.42 ± .237 (5)		3.00 ± .055 (5)	+	3.32 ± .107 (5)	
ALK-P (IU/L)		87.00 ± 15.0 (5)	85.80 ± 3.37 (5)		69.40 ± 6.85 (5)		90.20 ± 12.6 (5)	
BUN (MG %)		16.00 ± 1.70 (5)	15.00 ± 1.79 (5)		12.20 ± .860 (5)		15.60 ± 1.44 (5)	
CA (MG %)		10.18 ± .153 (5)	10.30 ± .416 (5)		9.96 ± .144 (5)		10.56 ± .202 (5)	
CHOL (MG %)		164.40 ± 26.4 (5)	154.00 ± 10.8 (5)		138.80 ± 7.82 (5)		195.00 ± 19.5 (5)	
CREAT (MG %)		.82 ± .037 (5)	.86 ± .087 (5)		.68 ± .049 (5)		.70 ± .032 (5)	
GLUCOSE (MG%)		104.60 ± 9.46 (5)	95.20 ± 4.97 (5)		88.60 ± 3.39 (5)		88.60 ± 3.20 (5)	
P (MG %)	*	6.06 ± 1.18 (5)	4.70 ± .239 (5)		4.06 ± .211 (5)		5.22 ± .364 (5)	
LDH (IU/L)		54.40 ± 9.86 (5)	63.00 ± 4.60 (5)		56.40 ± 8.89 (5)		75.40 ± 12.3 (5)	
TRIG (MG %)	*	59.40 ± 15.5 (5)	37.80 ± 3.09 (5)		33.80 ± 3.93 (5)		44.60 ± 12.8 (5)	
URIC ACID(MG%)		1.04 ± .117 (5)	.86 ± .093 (5)		.58 ± .037 (5)	* B	.74 ± .068 (5)	
PROTEIN (GM%)		6.32 ± .213 (5)	6.12 ± .388 (5)		5.56 ± .112 (5)		5.72 ± .139 (5)	
SGPT (IU/L)		26.80 ± 1.66 (5)	27.40 ± 2.91 (5)		28.80 ± 1.39 (5)		26.40 ± 2.77 (5)	
SGOT(IU/L)		33.40 ± 1.96 (5)	34.20 ± 1.93 (5)		34.20 ± 2.92 (5)		32.80 ± 2.80 (5)	
BILI (MG %)		.14 ± .024 (5)	.14 ± .024 (5)		.14 ± .024 (5)		.22 ± .020 (5)	D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 30

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY T R
ALBUMIN (GMZ)		3.48 ± .139 (5)	3.62 ± .201 (5)		3.82 ± .193 (5)		4.00 ± .105 (5)
ALK-P (IU/L)		35.40 ± 7.81 (5)	53.20 ± 6.05 (5)		46.60 ± 10.2 (5)		56.00 ± 12.2 (5)
BUN (MG Z)		12.80 ± .800 (5)	16.60 ± 1.47 (5)		14.40 ± 1.21 (5)		13.60 ± .980 (5)
CA (MG Z)		10.82 ± .183 (5)	10.42 ± .171 (5)		10.58 ± .153 (5)		10.64 ± .199 (5)
CHOL (MG Z)		111.00 ± 4.82 (5)	123.80 ± 16.2 (5)		109.80 ± 18.4 (5)		122.00 ± 11.8 (5)
CREAT (MG Z)		.70 ± .055 (5)	.64 ± .024 (5)		.76 ± .040 (5)		.66 ± .024 (5)
GLUCOSE (MGZ)		87.80 ± 4.97 (5)	97.00 ± 3.54 (5)		87.80 ± 4.68 (5)		91.20 ± 1.50 (5)
P (MG Z)		4.90 ± .383 (5)	4.68 ± .183 (5)		5.56 ± .317 (5)		5.34 ± .371 (5)
LDH (IU/L)	*	43.60 ± 5.25 (5)	35.40 ± 10.3 (5)		29.80 ± 2.71 (5)		70.40 ± 21.9 (5)
TRIG (MG Z)		40.60 ± 4.97 (5)	42.60 ± 8.98 (5)		48.20 ± 6.28 (5)		40.00 ± 1.82 (5)
URIC ACID(MGZ)		1.34 ± .194 (5)	1.18 ± .124 (5)		.90 ± .155 (5)		.80 ± .138 (5)
PROTEIN (MGZ)		6.14 ± .144 (5)	6.14 ± .154 (5)		6.00 ± .055 (5)		5.90 ± .161 (5)
SGPT (IU/L)	+	27.80 ± 2.85 (5)	50.40 ± 16.9 (5)		30.60 ± 1.36 (5)		28.20 ± 3.22 (5)
SGOT(IU/L)	+	21.00 ± .775 (5)	29.20 ± 2.35 (5)	*	27.20 ± 7.50 (5)		23.80 ± 2.69 (5)
BILI (MG Z)		.67 ± .034 (5)	.73 ± .102 (5)		.69 ± .089 (5)		.87 ± .036 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X .

TABLE 31

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE DOGS AFTER 24 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS						T R
			.05 MG/KG/DAY	T R	.5 MG/KG/DAY	T R	5.0 MG/KG/DAY	T R	
ALBUMIN (GMZ)		3.56 ± .068 (5)	3.46 ± .081 (5)		3.74 ± .204 (5)		3.86 ± .234 (5)		
ALK-P (IU/L)	*	72.40 ± 27.0 (5)	59.80 ± 6.04 (5)	x	44.20 ± 3.94 (5)	x	50.40 ± 11.8 (5)	x	x
BUN (MG Z)		15.00 ± 1.18 (5)	15.40 ± 2.32 (5)		14.00 ± 1.05 (5)		13.60 ± .678 (5)		
CA (MG Z)		10.76 ± .129 (5)	10.30 ± .155 (5)		10.64 ± .333 (5)		10.88 ± .193 (5)		
CHOL (MG Z)		124.60 ± 16.9 (5)	158.60 ± 9.35 (5)		127.00 ± 5.03 (5)		137.00 ± 18.2 (5)		
CREAT (MG Z)		.64 ± .024 (5)	.68 ± .037 (5)		.66 ± .040 (5)		.74 ± .051 (5)		A
GLUCOSE (MGZ)		86.80 ± 3.14 (5)	92.00 ± 3.85 (5)		91.40 ± 4.13 (5)		90.40 ± 2.93 (5)		
P (MG Z)		4.80 ± .313 (5)	4.04 ± .435 (5)		4.48 ± .343 (5)		4.62 ± .581 (5)		
LDH (IU/L)		30.20 ± 4.28 (5)	26.60 ± 1.89 (5)		27.20 ± 4.91 (5)		33.20 ± 5.70 (5)		
TRIG (MG Z)	*	41.20 ± 5.43 (5)	52.20 ± 2.71 (5)		48.00 ± 2.21 (5)		47.20 ± 9.93 (5)		
URIC ACID(MGZ)		1.90 ± .392 (5)	1.44 ± .337 (5)		1.10 ± .493 (5)		.68 ± .132 (5)		B
PROTEIN (MGZ)		5.86 ± .103 (5)	5.92 ± .229 (5)		5.74 ± .204 (5)		5.74 ± .163 (5)		
SGPT (IU/L)		26.80 ± 1.36 (5)	23.00 ± 1.38 (5)		22.60 ± .510 (5)		21.20 ± 1.43 (5)		*
SGOT(IU/L)		21.40 ± 1.60 (5)	24.00 ± 2.63 (5)		22.40 ± .980 (5)		22.00 ± 1.82 (5)		
BILI (MG Z)		.68 ± .020 (5)	.69 ± .075 (5)		.87 ± .092 (5)		.80 ± .060 (5)		

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,

20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x.

(significantly so for females, in both cases). None of these values was outside the range of control values for beagles in our experience. At the low dose, triglyceride determinations for females were significantly high, but the values were also within the normal range (Tables E-1 and E-2, Appendix E).

After 17 weeks of treatment (Tables 28 and 29) those changes that are noteworthy and that were considered to be possibly related to treatment were the trend toward hypoglycemia at the middle and high doses, the elevation in LDH and bilirubin at the high dose, and the slight elevation in cholesterol at the high dose. Although the elevation in LDH was not cited statistically at 17 weeks, presumably because of the large variance in the individual results, three of the five individual values for males were much higher than normal and the trend had been toward increasingly high LDH for this group since the start of the study. Interestingly, male C3-33, which was found to have neurological lesions, had the lowest LDH value of the 5 males at this recording (and at sacrifice). Also, SGOT levels for males and females at the high dose were normal. The elevation in LDH is then probably not due to brain damage or myocardial infarctions. Furthermore, the elevation in LDH failed to correlate with the severity of anemia in these animals.

The slight decreases in Ca^{2+} values after 8 weeks of high-dose treatment was not seen after 17 weeks. The effect on Ca^{2+} may have been transient or may simply have been due to normal variations for groups of such small size. At the 0.5-mg/kg/day level, albumin values were significantly low in both sexes and in the males, total protein was also low at both the middle and high doses. No dose relationship for this effect was obvious from the data, so its significance is obscure. Lower glucose values were evident at both the 0.5- and 5.0-mg/kg/day levels, in contrast to the trend at 8 weeks of treatment, when only the dogs at the highest level showed lower glucose. Again, these values were well within the normal range.

At 24 weeks (one week prior to sacrifice), the only statistical citations (Tables 30 and 31) are significantly high SGOT for males at the 0.05-mg/kg/day level and low SGPT for females at the 5.0-mg/kg/day level, but these values are not abnormally altered. Calcium, glucose, and phosphorus values were normal for the treatment groups. The hypoglycemic trend observed at weeks 8 and 17 was probably due to normal variations in values among groups this size. Except for one dog, C3-33 a male, dogs had returned to those values recorded before treatment began (Tables 24 and 25). The elevated LDH values may have toxicological significance (see ECG Analysis below).

Urinalysis

There were no abnormal findings from urinalysis. Dog C3-34, a high-dose female, had a slightly elevated RBC count, but since nothing was found in hematological and microscopic tests on this animal that might account for this, the finding was ascribed to contamination of the sample during urine collection from the bladder.

ECG Analysis

Electrocardiograms (ECG) were taken on all dogs prior to sacrifice. When compared to their pre-dosing ECGs, little was noted other than an occasional inverted T-wave, but this is usually seen in dogs from time to time. C3-35 did have some arrhythmias and missed ventricular contractions. This dog also had an elevated LDH activity (the highest of the 10 dogs) throughout the study (except for his pretest LDH). This suggests that it may have been experiencing continued myocardial ischemia or damage.

Histopathology

The summary of lesions found microscopically in the tissues from the dogs at the end of the study is presented in Tables 32 and 33. The most notable findings were the lesions in the brain of dog C3-33 (described in detail below), the appearance of hemosiderosis of the spleen in 6 of the 10 high-dose dogs, and pigmentation of the Kupffer cells and sinus macrophages in livers of all high-dose dogs. Because the effects on the liver and spleen were either less frequent or absent in the other treatment groups, these findings in the high-dose dogs were attributed to the treatment. A solitary focus of congestion at the end of the spleen occurred in 6 of the 10 dogs at the intermediate treatment level (0.5 mg/kg/day), and 3 of the 10 dogs at the high dose level. This observation may also relate to the treatment. No histopathological lesions were found in the heart tissues from dog C3-35.

Clinical signs of neurological damage in dog C3-33 had been detected during the 6-month subacute study on condensate water. Therefore, a detailed pathological examination of tissues from selected regions of the central nervous system was conducted on all the dogs by our neuropathologist consultant, Dr. Webb Haymaker. His report is appended in full (Appendix F).

Using standard hematoxylin and eosin staining procedures, Dr. Haymaker found no significant changes in the brains of 29 of the exposed dogs or in the 10 control dogs. In the thirtieth animal, dog C3-33, he did observe pathologic changes, and special staining techniques were used to assess the changes more specifically. The most outstanding pathological feature was the complete loss of the

Table 32

MICROSCOPIC LESIONS IN MALE DOGS AFTER 26 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level (mg/kg-day)				
	0	0.05	0.5	5.0	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Aorta					
Focal calcification (near aorta)		15			
Brain					
Slight focal hemorrhage (medulla oblongata; see Haymaker's report)		19	21	33	
Esophagus					
Intramucosal mucous cyst				31	
Kidneys					
Slight focal calcification	1,3,5,7,9	11,13,15 17,19	23,25,27 29	31,33,35 37,39	
Liver					
Acute focal triaditis, mild and pigmented; Kupffer cells and/or macrophages				37	
Pigmented Kupffer cells and/or macrophages				31,33,35, 39	
Lymph Nodes					
Medullary congestion		11		39	
Granulomas, slight focal				35	
Lungs					
Focal alveolar collapse		17	25		
Focal alveolar distension				35,37	
Peribronchi, subacute; focal distension collapse of alveoli	1				
Focal distension and collapse of alveoli	5,7,9	11,13,15 19	21,23,29	31,33,39	
Parathyroid					
Solitary focal cyst			21		

MICROSCOPIC LESIONS IN MALE DOGS AFTER 26 WEEKS OF CONDENSATE WATER TREATMENT

[illegible]

Table 33

MICROSCOPIC LESIONS IN FEMALE DOGS AFTER 26 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level (mg/kg-day)				
	0	0.05	0.5	5.0	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Aorta					
Focal calcification (near aorta)		18		34	
Cecum					
Moderate solitary hemorrhage	6				
Duodenum					
Parasite in lumen				36	
Kidneys					
Slight focal calcification	2,4,6	12,14,16	22,24,26	32,34,38	
Moderate focal infarcts (in one kidney); slight focal calcification				36	
Liver					
Acute focal triaditis, mild pigmented Kupffer cells and/or macrophages	10	20	26	32,34,36 38,40	
Lungs					
Focal alveolar collapse			22,24,28	38	
Focal distension and collapse of alveoli	2,4,6,10	18,20	26,30	34,36	
Granuloma, few and small; focal distension and collapse of alveoli	8			32	
Focal bronchopneumonia, subacute; focal distension and collapse of alveoli		14		40	
Lung worms; focal distension and collapse of alveoli		12,16			
Lymph nodes					
Granulomas, slight focal				36	
Medullary congestion		20	30		

MICROSCOPIC LESIONS IN FEMALE DOGS AFTER 26 WEEKS OF CONDENSATE WATER TREATMENT

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entire lenticular nucleus (putamen and globus pallidus) and substantia nigra bilaterally. All that remained from the necrosis was a filmy connective tissue framework. Astroglioses were observed along the border of the absent gray matter. Small cavitations, surrounded by a corona of hypertrophied astrocytes, were found in the caudate nuclei.

Demyelination was observed in a number of other regions: the lower part of the cerebrum, pyramidal tracts in the cervical cord, the basis pedunculi next to the substantia nigra, the cerebellum, and pons unilaterally (near the vestibular nuclei and beyond, with an appearance of "softened" tissue and macrophage collections). A number of nerve cells in this region had disintegrated. A second, smaller lesion in the same position was noted in the other side of the pons.

The optic nerve was not demyelinated, but silver-stained sections suggested the presence of astroglial hypertrophy all through the nerves. The animal might have been blind, but this could not be clearly substantiated.

Dog C3-33 had exhibited severe neurological disturbances, which included thrashing its head and body about, an inability to stand, spasticity of the forelimbs and flaccidity of the hind limbs, constant turning of its head from side to side, and a lack of control of head extensors. Since similar histologic changes have been associated with head trauma in humans, it is hypothesized that in dog C3-33, compound-induced pathologic changes in the nervous tissue resulted in motor dysfunction that led to trauma, resulting in further neural damage. For example, damage in the vestibular nuclei could have led to inability to maintain balance and damage in the basis pedunculi could have resulted in forelimb spasticity.

Noting that the lesions in this animal's brain were infarcts, probably caused by cessation or severe reduction of blood flow to the damaged areas, Dr. Haymaker suggested that "following head impact the brain became edematous and that, being displaced medialward on the two sides, squeezed (1) the anterior choroidal arteries (originating from the circle of Willis), interrupting blood flow to the lenticular nucleus bilaterally, and (2) the posterior choroidal arteries (springing from the first part of the posterior cerebral artery), interrupting blood flow to the substantia nigra bilaterally." This mechanism has also been proposed in the past for corresponding lesions produced by carbon monoxide poisoning, barbituate poisoning, and heroin overdoses in humans.

Discussion

The only noteworthy findings occurred in the dogs at the high dose (5.0 mg/kg/day). These dogs showed alterations in hematological and clinical chemistry parameters, organ weight differences, neurological symptoms, and microscopic lesions.

Dogs treated with the high dose exhibited marginal decreases in erythrocytes, hemoglobin, and hematocrit, accompanied by reticulocytosis. These observations suggested that the animals were suffering from a mild compensatory anemic state. This state was transitory, however, and was not observed at all in the dogs examined after 24 weeks of the treatment. Although recovery groups were not included in this study, it appears likely--based on the adaptiveness of the hematopoietic system to the treatment with time--that these hematological effects are reversible.

At various stages in the study, alterations in several clinical chemistry parameters were observed in the high-dose dogs that were thought to be related to the treatment. These alterations included low glucose, phosphorus, and/or Ca^{2+} levels and high LDH relative to controls. Most of the values were not outside the normal range and we were unable to ascribe any clear-cut toxicological significance to them. They were probably due to normal variations in the values for groups this size. The only possible exception to these statements was the high LDH for males on Week 17 (Table 28). The dog with the highest LDH activity also had alterations in its ECG pattern, suggesting that it was experiencing myocardial ischemia or damage, which may have resulted from the treatment.

Histopathological examination of tissues from the dogs at sacrifice revealed hemosiderosis of the spleen in the majority and pigmentation of the Kupffer cells and sinus macrophages in livers of all high-dose dogs. The spleen was congested in several animals at this and the intermediate dose level; the relationship to treatment is obscure, however. No alterations or clinical symptoms were seen in dogs at the lowest dose level.

The pathological investigation of dog C3-33, a high-dose male, revealed frank and extensive neurological damage. The sites affected were consistent with many of the clinical symptoms seen in this animal. Head trauma was considered to be the probable cause.

The consultant neuropathologist was unable to conclude from his investigation that the test mixture itself was the factor responsible for the brain changes since none of the other high-dose dogs exhibited any neuropathologic effects. However, similar behavioral and histologic changes were observed in a past subacute study on dogs treated with 2,4-dinitrotoluene (2,4-DNT), the major constituent of the condensate mixture.³⁹ Dogs that received the high dose in that study exhibited

neuromuscular lesions (mild demyelination, gliosis, and edema in the central nervous system). One of two dogs had demyelination of the optic nerve and suffered from transient blindness. Although the dose of 2,4-DNT administered in that study was much higher (25 mg/kg/day) than in our study on condensate water (3 mg/kg/day, on the basis of 2,4-DNT content in the condensate water mixture), a wide variation in individual susceptibility to 2,4-DNT poisoning has been noted in the past. The neurological effects and lesions seen with 2,4-DNT were not observed with 2,6-DNT, the second largest constituent of the condensate water mixture, even at doses as high as 100 mg/kg/day.⁴⁰ Consequently, the possibilities that the neurological and neuropathological effects observed in dog C3-33 were due to the treatment, directly or indirectly, and that the component in the mixture responsible for the effects was 2,4-DNT cannot be discounted.

It may be concluded, then, that the 5.0-mg/kg/day level is an effect level for the 30-component condensate water mixture in dogs. The lowest levels, 0.05 and 0.5 mg/kg/day, produced no alterations or clinical symptoms that were clearly attributable to the treatment, and the 0.5 mg/kg/day level is therefore designated as the "no observable effect" level in dogs.

STUDIES IN RATS

Procedures

Housing and Treatment

Eighty-five male and 85 female Sprague-Dawley (outbred) rats, approximately 6 weeks old, were obtained from Simonsen Laboratories, Gilroy, California, on the same day. They were quarantined for 1 week to ensure that only healthy animals were used in the study. The animals were assigned either three or two to a cage in the order they were received off the truck. The cages (plastic with wire tops) were then randomly assigned to groups in the following sequence: controls, low dose, mid dose, and high dose; each group (20 males and 20 females) was completed before the next was started. Individual animals were identified with cage cards and ear punches.

Diets were prepared as follows: A stock suspension of the condensate blend was made by dissolving 22.5 g of the blend (composition as in Table 1 for the Phase I test mixture) in 60 ml of acetone, mixing this solution with 977.5 g of powdered Purina Laboratory Chow* in a ceramic bowl, and allowing the acetone to evaporate off (24 hours) through a loose-fitting aluminum foil cover. Diets were made by diluting an appropriate amount of the stock mixture with the powdered chow (mixed first with acetone solvent in the same volume/weight proportion to the chow and evaporated off in the same way as above) in 22.5-kg batches, using a Hobart H-600-T rotary mixer. The diet levels were prepared in descending order of concentration--0.10%, 0.01%, and 0.001% condensate blend by weight--by diluting aliquots of the next highest diet level with powdered chow. The control diet was powdered Purina Laboratory Chow with 0% condensate blend but pretreated with acetone as above. The diets were placed in hanging feeders in the cages and added to or changed weekly as the supply warranted. All diets were kept refrigerated until used, and fresh diets were prepared biweekly. Analysis of the components in the diets and stability of the condensate blend were determined as described under "Quality Assurance". In stability experiments the blend concentration was unchanged after 4 weeks.

At the end of 4 weeks of treatment, five males and five females from each group were killed, and five males and five females from each group were placed on recovery (the condensate-free diet) for 4 more weeks before they were killed. The remaining rats were continued on treatment for a total of 13 weeks. At the end of that period, half the rats were killed and the other half were allowed a 4-week recovery

* Rodent Laboratory Chow 5001 (formerly Laboratory Chow 5001).

period before they were killed. The rats for the 17-week necropsy were deprived of food for 24 hours before necropsy; inadvertently those in the other necropsies were not starved prior to being killed.

Tests

Each rat was weighed weekly. Food consumption per cage was determined weekly by calculating the difference between initial and final feeder weights. These differences were summed for all cages per group and divided by the number of animal days for that group during the week. (Animal days = the number of the animals in the group times the sum of the number of days each survived during the week.) All animals were observed daily, and any unusual signs were recorded.

Blood and serum samples were collected at each sacrifice time; the samples were placed on ice and delivered promptly to SRI's Clinical Chemistry Laboratory for analysis. Immediately before sacrifice, each rat was anesthetized with 0.5 ml Pentothal intraperitoneally (ip) and blood was collected directly into a 10-ml syringe after puncture of the heart. The blood was transferred immediately to Vacutainers for determination of CBCs, hemoglobin, hematocrit, and clinical chemistry in the same manner as for dogs. Reticulocytes and Heinz bodies (high-dose and control groups) were also determined.

Immediately after sacrifice, the brain, heart, liver, kidneys, spleen, and gonads (males only) were weighed. The absolute organ weights were recorded, and weight ratios were calculated and evaluated as for dogs. Other tissues that were examined were the adrenal, aorta, bone, bone marrow, cecum, cervix, colon, duodenum, epididymis, esophagus, eye, ileum, jejunum, lung, lymph node, sciatic nerve, ovary, pancreas, pituitary, prostate, salivary gland, seminal vesicle, uterus, skeletal muscle, skin, spinal cord, stomach, thymus, thyroid, trachea, urocyt, and vagina. The mammary glands and parathyroids were also examined, but in fewer instances. Mammary glands were examined in fewer instances since they were not always present in skin segments. This is especially true of male rodents where glands are less well developed. Fewer sections of parathyroid were examined because of difficulty in including these small structures in the section of thyroid glands. Multiple sections could have been used but this is expensive and was considered unnecessary because those structures that were examined were within normal limits. Any additional tissues of unusual appearance at necropsy were also examined microscopically. All tissues were fixed for histopathological examination in the same manner as for dogs.

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MAMMALIAN TOXICOLOGICAL EVALUATIONS OF TNT WASTEWATERS. VOLUME --ETC(U)

APR 79 J V DILLEY, C A TYSON, G W NEWELL

DAMD17-76-C-6050

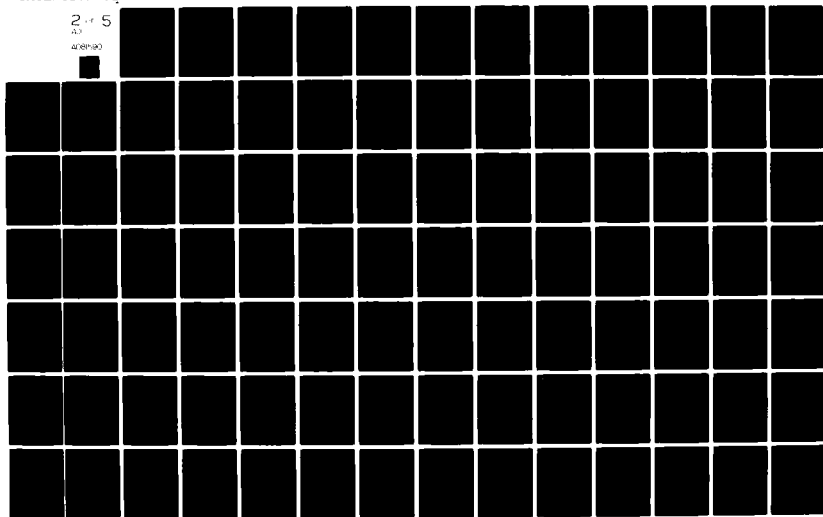
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Results

Observations

Several rats were seen to wheeze or sneeze occasionally and/or had rales during Weeks 1 through 4, but not thereafter. These instances were about equally distributed among the groups and never exceeded three animals per group at any time. Male rats at the 0.10% dose level also had rough fur, beginning at the end of the second week of treatment and continuing, in some animals, through Week 12. Some rats in this group had slight pallor of the extremities beginning in Week 3 and lasting throughout the treatment period and part of the recovery period. During Weeks 5 and 6, five of the high-dose males had dilated pupils and one had miosis; however, these conditions were not seen again. Two of these males became ataxic and appeared depressed during Week 5. Their condition gradually worsened. Each favored one side or the other, was emaciated, had dark urine (not red), and moderately rough fur. One of the two was seen to breathe deeply and rapidly, was very thin, had very rough fur, and was observed circling the cage; it eventually became moribund and died on Week 10. This animal had had the lowest body weight gain of any male; its weight was maximal 170 g at Week 4 and decreased gradually thereafter to 126 g at Week 8 and 101 g at death. Cause of death was not determined.

Females at the 0.10% dose level also had rough fur and appeared anemic (pale extremities) beginning in Week 4. Other observations on this group included occasional humped backs, ataxia, slight depression, and, in one female, weak extremities and exophthalmos. No unscheduled deaths occurred among the females.

One of the control males began to exhibit rough fur during the tenth week of the study and a bloody discharge emanated from its left eye in the eleventh week and continued until sacrifice. This male lost weight during Weeks 10 through 13. At sacrifice, its teeth were found to be unusually long and embedded in the upper lip; microscopic examination of tissues from this rat confirmed that the immediate cause of death was starvation.

Body Weights

Mean weekly body weights of rats subjected to the condensate blend treatment are given in Tables 34 and 35. Males and females at the 0.10% treatment level showed a significant ($p < 0.01$) depression in body weight throughout the 13-week period relative to controls. The males at this level weighed 34% and 29% less than control males at 8 and 13 weeks, respectively, which led to a change in the ratio test from a B to an A for Week 12. This apparent improvement is artifactual, however. The body weight of the control male noted as being sickly at death rose slower than those of the others--to a peak

TABLE 34

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
INITIAL		144.70 ± 2.64 (20)	143.55 ± 2.45 (20)		150.80 ± 1.93 (20)	143.65 ± 2.24 (20)
WEEK 1		188.20 ± 3.88 (20)	186.75 ± 3.46 (20)		197.50 ± 2.87 (20)	157.90 ± 2.94 (20) + A
WEEK 2		236.95 ± 4.18 (20)	231.40 ± 3.84 (20)		242.95 ± 3.38 (20)	180.70 ± 4.31 (20) + A
WEEK 3		272.65 ± 4.56 (20)	270.80 ± 4.02 (20)		278.00 ± 3.67 (20)	200.05 ± 5.54 (20) + B
WEEK 4		301.95 ± 4.76 (20)	302.00 ± 4.05 (20)		312.00 ± 4.33 (20)	213.50 ± 6.27 (20) + B
WEEK 5		325.27 ± 5.96 (15)	323.70 ± 5.96 (10)		336.00 ± 4.86 (10)	224.40 ± 10.2 (10) + B
WEEK 6	*	348.93 ± 6.10 (15)	345.80 ± 5.67 (10)		356.70 ± 4.92 (10)	236.70 ± 12.9 (10) + B
WEEK 7	*	362.87 ± 7.43 (15)	362.40 ± 5.16 (10)		375.70 ± 5.78 (10)	241.30 ± 14.8 (10) + B
WEEK 8	*	381.47 ± 9.20 (15)	380.10 ± 5.52 (10)		389.70 ± 6.10 (10)	252.00 ± 16.6 (10) + B
WEEK 9	+	392.60 ± 13.8 (10)	394.10 ± 4.64 (10)		404.70 ± 6.75 (10)	257.40 ± 19.6 (10) + B
WEEK 10	*	408.20 ± 12.4 (10)	407.40 ± 4.11 (10)		415.40 ± 7.27 (10)	280.44 ± 10.5 (9) + B
WEEK 11	+	413.10 ± 16.6 (10)	419.30 ± 4.03 (10)		428.70 ± 7.15 (10)	288.22 ± 10.3 (9) + B
WEEK 12	+	421.90 ± 20.5 (10)	436.60 ± 4.01 (10)		439.30 ± 7.32 (10)	296.44 ± 11.3 (9) + A
WEEK 13	+	426.00 ± 26.7 (10)	444.10 ± 4.49 (10)		447.60 ± 7.72 (10)	304.44 ± 11.2 (9) + A

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G) OF FEMALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T	R	T	R	T	R
INITIAL	*	169.45 ± 2.51 (20)	163.65 ± 2.65 (20)		162.15 ± 1.56 (20)	*	156.95 ± 3.15 (20)	*
WEEK 1		183.15 ± 2.97 (20)	184.05 ± 2.29 (20)		178.90 ± 1.62 (20)		162.00 ± 2.25 (20)	+
WEEK 2		200.35 ± 2.96 (20)	199.80 ± 2.53 (20)		193.85 ± 1.80 (20)		166.50 ± 2.23 (20)	+ A
WEEK 3		212.75 ± 3.20 (20)	211.50 ± 2.88 (20)		206.35 ± 2.26 (20)		177.45 ± 2.81 (20)	+ A
WEEK 4		222.30 ± 3.08 (20)	227.45 ± 2.54 (20)		217.85 ± 2.66 (20)		184.35 ± 2.99 (20)	+ A
WEEK 5		232.67 ± 3.33 (15)	234.80 ± 4.20 (10)		224.20 ± 4.71 (10)		190.90 ± 2.69 (10)	+ A
WEEK 6		239.20 ± 3.50 (15)	245.70 ± 4.44 (10)		228.10 ± 5.70 (10)		198.10 ± 2.12 (10)	+ A
WEEK 7		244.40 ± 3.87 (15)	248.00 ± 4.72 (10)		235.30 ± 6.17 (10)		203.00 ± 2.43 (10)	+ A
WEEK 8	+	253.07 ± 4.38 (15)	252.20 ± 5.70 (10)		241.70 ± 6.10 (10)		209.20 ± 1.28 (10)	+ A
WEEK 9		255.10 ± 5.78 (10)	258.30 ± 5.21 (10)		247.80 ± 5.92 (10)		212.50 ± 2.58 (10)	+ A
WEEK 10		258.80 ± 5.66 (10)	262.40 ± 6.24 (10)		250.90 ± 6.27 (10)		214.60 ± 2.44 (10)	+ A
WEEK 11		261.50 ± 5.90 (10)	269.50 ± 7.03 (10)		256.80 ± 6.60 (10)		217.40 ± 2.97 (10)	+ A
WEEK 12		270.90 ± 5.96 (10)	272.70 ± 6.38 (10)		264.10 ± 6.87 (10)		216.10 ± 5.08 (10)	+ A
WEEK 13		271.20 ± 6.27 (10)	276.00 ± 7.99 (10)		263.20 ± 6.79 (10)		221.10 ± 5.85 (10)	+ A

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

* CONFIDENCE LEVEL = .99

95% CONFIDENCE LEVEL = .99
BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

EC - PAIRED CHI-SQUARE ; I - TREATMENT-CONTROL CONTRAST
 B - PAIRED CHI-SQUARE ; II - TREATMENT-CONTROL CONTRAST
 20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - x.

of 310 g at Week 10--and decreased thereafter. At the time it was killed, this animal weighed only 194 g. Because of this animal's low body weight, the mean values for the controls during Weeks 10 through 13 are lower than normal (Appendix E, Table E-3). If the mean body weight of the high-dose males is compared with that of the nine healthy control males at Week 13 (452 g instead of 426 g), the depression in body weight at the high dose is 33%, or virtually the same as it was at Week 8. Thus, there is no evidence of adaptation to the treatment or recovery from depression in body weight among high-dose male rats with time over the 13-week treatment period.

Body weight differences for rats during the treatment period are presented in Tables 36 and 37. Body weight gain of both males and females at the high dose was significantly depressed during the first two weeks and tended to remain lower than in controls for the first 10 weeks of the study. During Weeks 11 and 13, males at the high dose actually grew faster than the controls did. When body weight gain for the males at the 0.10% level is compared with that of control males having approximately the same body weight (Week 4 controls, Table 34), however, it can be seen that those treated rats had not resumed a normal growth pattern. Similar analysis of the female weight data leads to the same conclusion: body weight gain at the high dose level is substantially less than that of controls throughout the study, notwithstanding the uncharacteristically high body weight gain during Week 13 compared with the preceding 4 weeks. Analysis of body weight gain data, then, shows depressed growth rate at the high dose, with no clear evidence of recovery in this measure during treatment.

Weekly body weight data for rats allowed 4 weeks of recovery following treatment are listed in Tables 38 through 41. After 4 weeks of treatment (Tables 38 and 39), rats at the 0.10% condensate blend level showed improvement during the recovery period to the point where by Week 8 there were no significant differences from control values. Rats allowed recovery after a longer treatment period (13 weeks, Tables 40 and 41) did not show as much improvement: body weights of the high-dose animals at Week 17 were still significantly lower ($p < 0.01$, t -test = B for males; $p < 0.05$ for females) than for controls.

Body weight differences for these rats weekly are presented in Tables 42 through 45. Body weight gain at the high dose level is severely depressed during the first two weeks of treatment relative to controls. The high-dose animals do not resume a normal growth rate and weight gain continues to lag behind that of controls, particularly for males (significantly so at several weighings), through Week 10. In Weeks 11 through 13, when control rats are nearing maturity, these differences either disappear or are reversed.

For animals allowed recovery after 4 weeks of treatment, there is a dramatic surge in weight gain in both sexes at the 0.10% condensate blend level and in females at the 0.01% level during the first week

TABLE 36

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
WEEK 1		43.50 ± 1.96 (20)	43.20 ± 1.91 (20)		46.70 ± 1.87 (20)	14.25 ± 2.32 (20) + D
WEEK 2	+	48.75 ± 1.19 (20)	44.65 ± 2.11 (20)		45.45 ± 1.07 (20)	22.80 ± 3.08 (20) + C
WEEK 3		35.70 ± 2.89 (20)	39.40 ± 1.62 (20)		35.05 ± 1.84 (20)	19.35 ± 2.21 (20) + B
WEEK 4		29.30 ± 1.80 (20)	31.20 ± 2.40 (20)		34.00 ± 1.89 (20)	13.45 ± 1.86 (20) + C
WEEK 5		22.47 ± 2.17 (15)	26.50 ± 1.54 (10)		19.40 ± 1.98 (10)	15.00 ± 3.57 (10)
WEEK 6	+	23.67 ± 1.27 (15)	22.10 ± .567 (10)		20.70 ± 1.45 (10)	12.30 ± 3.54 (10) + A
WEEK 7		13.93 ± 1.82 (15)	16.60 ± 1.39 (10)		19.00 ± 1.57 (10)	4.60 ± 2.76 (10) + C
WEEK 8	*	18.60 ± 2.19 (15)	17.70 ± 1.08 (10)		14.00 ± 1.48 (10)	10.70 ± 3.30 (10)
WEEK 9	+	17.00 ± 1.67 (10)	14.00 ± 1.51 (10)		15.00 ± 1.05 (10)	5.40 ± 3.70 (10) + A
WEEK 10		15.60 ± 1.77 (10)	13.30 ± 1.36 (10)		10.70 ± 1.08 (10)	5.67 ± 2.67 (9) + C
WEEK 11	+	4.90 ± 4.45 (10)	11.90 ± .722 (10)	x	13.30 ± .684 (10)	7.78 ± .910 (9) x
WEEK 12	+	8.80 ± 4.14 (10)	17.30 ± 1.13 (10)	x	10.60 ± .945 (10)	8.22 ± 1.95 (9) x
WEEK 13	+	4.10 ± 6.66 (10)	7.50 ± 1.66 (10)	x	8.30 ± 1.76 (10)	8.00 ± 2.12 (9) x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 37

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
WEEK 1	*	13.70 ± 1.28 (20)	20.40 ± 1.96 (20)	*	16.75 ± 1.09 (20)	5.05 ± 1.88 (20) + B
WEEK 2		17.20 ± .854 (20)	15.75 ± 1.27 (20)		14.95 ± 1.18 (20)	4.50 ± .988 (20) + D
WEEK 3	*	12.40 ± 1.52 (20)	11.70 ± 2.03 (20)		12.50 ± 1.18 (20)	10.95 ± 1.14 (20)
WEEK 4	*	9.55 ± .749 (20)	15.95 ± 1.37 (20)	+ B	11.50 ± .866 (20)	6.90 ± 1.12 (20)
WEEK 5	*	8.27 ± 1.17 (15)	4.00 ± 2.61 (10)		7.80 ± .964 (10)	5.10 ± 1.57 (10)
WEEK 6	*	6.53 ± .872 (15)	10.90 ± 2.53 (10)		3.90 ± 1.68 (10)	7.20 ± 1.25 (10)
WEEK 7	+	5.20 ± .725 (15)	2.30 ± 4.32 (10)		7.20 ± 1.65 (10)	4.90 ± 1.93 (10)
WEEK 8		8.67 ± 1.68 (15)	4.20 ± 1.97 (10)		6.40 ± 1.07 (10)	6.20 ± 1.56 (10)
WEEK 9	*	7.50 ± 1.40 (10)	6.10 ± 1.69 (10)		6.10 ± .657 (10)	3.30 ± 1.92 (10)
WEEK 10	*	3.70 ± .844 (10)	4.10 ± 1.88 (10)		3.10 ± 1.25 (10)	2.10 ± .605 (10)
WEEK 11		2.70 ± .943 (10)	7.10 ± 1.22 (10)		5.90 ± 1.09 (10)	2.80 ± 1.10 (10)
WEEK 12		9.40 ± 1.12 (10)	3.20 ± 1.29 (10)	B	7.30 ± 1.44 (10)	-1.30 ± 2.45 (10) + D
WEEK 13		.30 ± 1.30 (10)	3.30 ± 2.29 (10)	x	-.90 ± 1.05 (10)	5.00 ± 1.22 (10) x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 38

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET		IN DIET		IN DIET	
			T	R	T	R	T	R
INITIAL		144.70 ± 2.64 (20)	144.80 ± 3.46 (5)		146.40 ± 3.67 (5)		148.80 ± 6.16 (5)	
WEEK 1		188.20 ± 3.88 (20)	184.20 ± 5.20 (5)		193.80 ± 5.55 (5)		162.80 ± 9.03 (5)	*
WEEK 2		236.95 ± 4.18 (20)	222.80 ± 6.89 (5)		238.00 ± 7.10 (5)		183.80 ± 13.5 (5)	+ A
WEEK 3		272.65 ± 4.56 (20)	265.00 ± 7.36 (5)		277.00 ± 8.94 (5)		203.60 ± 16.9 (5)	+ A
WEEK 4		301.95 ± 4.76 (20)	306.40 ± 6.27 (5)		306.60 ± 11.6 (5)		216.00 ± 16.5 (5)	+ B
WEEK 5		325.27 ± 5.96 (15)	334.60 ± 7.37 (5)		326.60 ± 15.0 (5)		271.00 ± 17.6 (5)	+
WEEK 6		348.93 ± 6.10 (15)	357.40 ± 6.85 (5)		346.80 ± 15.7 (5)		300.40 ± 18.2 (5)	+
WEEK 7		362.87 ± 7.43 (15)	377.80 ± 8.33 (5)		364.00 ± 14.9 (5)		319.40 ± 20.3 (5)	
WEEK 8		381.47 ± 9.20 (15)	404.60 ± 9.36 (5)		388.60 ± 18.0 (5)		345.00 ± 21.4 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 39

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
INITIAL		169.45 ± 2.51 (20)	160.20 ± 7.74 (5)		159.20 ± 2.91 (5)	154.40 ± 3.23 (5)
WEEK 1		183.15 ± 2.97 (20)	180.60 ± 3.54 (5)		177.20 ± 3.69 (5)	156.00 ± 2.45 (5) +
WEEK 2		200.35 ± 2.96 (20)	195.80 ± 3.93 (5)		193.40 ± 3.67 (5)	159.60 ± 4.06 (5) + A
WEEK 3		212.75 ± 3.20 (20)	212.00 ± 5.93 (5)		208.00 ± 3.51 (5)	165.40 ± 6.12 (5) + A
WEEK 4		222.30 ± 3.08 (20)	228.00 ± 3.91 (5)		219.00 ± 5.16 (5)	173.40 ± 8.44 (5) + A
WEEK 5		232.67 ± 3.33 (15)	234.80 ± 5.14 (5)		233.20 ± 5.29 (5)	200.40 ± 4.01 (5) +
WEEK 6		239.20 ± 3.50 (15)	243.40 ± 5.54 (5)		240.80 ± 4.49 (5)	213.00 ± 3.56 (5) +
WEEK 7		244.40 ± 3.87 (15)	250.40 ± 6.05 (5)		248.60 ± 4.55 (5)	222.60 ± 3.25 (5) +
WEEK 8		253.07 ± 4.38 (15)	263.40 ± 10.4 (5)		261.60 ± 5.93 (5)	233.60 ± 3.17 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 40

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				T R	.01 % IN DIET	T R	.10 % IN DIET	T R
			.001 % IN DIET	T R	.01 % IN DIET	T R					
INITIAL	*	144.70 ± 2.64 (20)	141.20 ± 5.10 (5)		154.00 ± 1.30 (5)	*		140.20 ± 2.9 (5)			
WEEK 1	*	188.20 ± 3.88 (20)	185.40 ± 7.77 (5)		200.40 ± 2.01 (5)	*		159.60 ± 3.80 (5)			
WEEK 2		236.95 ± 4.18 (20)	227.00 ± 9.82 (5)		246.40 ± 3.78 (5)			179.60 ± 6.18 (5)			
WEEK 3		272.65 ± 4.56 (20)	261.40 ± 11.5 (5)		277.80 ± 4.24 (5)			193.00 ± 8.19 (5)			
WEEK 4		301.95 ± 4.76 (20)	289.00 ± 10.5 (5)		312.60 ± 6.08 (5)			209.60 ± 12.3 (5)			
WEEK 5		325.27 ± 5.96 (15)	315.00 ± 10.7 (5)		334.20 ± 8.49 (5)			220.60 ± 18.1 (5)			
WEEK 6		348.93 ± 6.10 (15)	337.20 ± 10.1 (5)		357.00 ± 9.38 (5)			233.20 ± 23.8 (5)			
WEEK 7		362.87 ± 7.43 (15)	355.40 ± 9.19 (5)		376.00 ± 11.5 (5)			238.40 ± 28.7 (5)			
WEEK 8		381.47 ± 9.20 (15)	374.00 ± 10.5 (5)		389.20 ± 12.8 (5)			244.40 ± 32.1 (5)			
WEEK 9	*	392.60 ± 13.8 (10)	388.40 ± 8.04 (5)		404.60 ± 14.3 (5)			245.20 ± 38.5 (5)			
WEEK 10		408.20 ± 12.4 (10)	404.60 ± 8.13 (5)		415.00 ± 15.2 (5)			283.25 ± 19.0 (4)			
WEEK 11		413.10 ± 16.6 (10)	417.20 ± 7.73 (5)		428.60 ± 15.0 (5)			291.25 ± 19.1 (4)			
WEEK 12		421.90 ± 20.5 (10)	435.80 ± 7.07 (5)		438.80 ± 15.4 (5)			302.00 ± 19.9 (4)			
WEEK 13	*	426.00 ± 26.7 (10)	439.40 ± 7.81 (5)		443.20 ± 15.7 (5)			307.25 ± 17.8 (4)			
WEEK 14		453.40 ± 4.45 (5)	450.40 ± 6.86 (5)		449.80 ± 15.7 (5)			319.50 ± 16.7 (4)			
WEEK 15		460.20 ± 3.65 (5)	454.40 ± 6.74 (5)		457.80 ± 15.0 (5)			330.00 ± 14.8 (4)			
WEEK 16		467.00 ± 5.50 (5)	464.80 ± 7.28 (5)		464.60 ± 14.0 (5)			335.75 ± 17.8 (4)			
WEEK 17		452.20 ± 5.30 (5)	449.80 ± 8.40 (5)		453.60 ± 14.8 (5)			319.25 ± 20.1 (4)			

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,

20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 41
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
INITIAL		169.45 ± 2.51 (20)	165.80 ± 5.13 (5)		165.80 ± 4.29 (5)	163.60 ± 1.91 (5)
WEEK 1	*	183.15 ± 2.97 (20)	186.20 ± 2.15 (5)		182.80 ± 2.08 (5)	167.40 ± 2.01 (5) *
WEEK 2	*	200.35 ± 2.96 (20)	202.40 ± 2.66 (5)		197.00 ± 3.81 (5)	171.60 ± 1.29 (5) *
WEEK 3		212.75 ± 3.20 (20)	218.60 ± 3.87 (5)		210.00 ± 6.38 (5)	183.60 ± 1.63 (5) *
WEEK 4		222.30 ± 3.08 (20)	234.20 ± 3.80 (5)		221.20 ± 7.66 (5)	188.40 ± 1.83 (5) *
WEEK 5	*	232.67 ± 3.33 (15)	236.60 ± 2.14 (5)		228.40 ± 8.13 (5)	191.60 ± 1.91 (5) *
WEEK 6	*	239.20 ± 3.50 (15)	244.40 ± 3.52 (5)		231.40 ± 9.12 (5)	199.00 ± 1.79 (5) *
WEEK 7		244.40 ± 3.87 (15)	248.80 ± 3.54 (5)		240.80 ± 10.4 (5)	202.40 ± 3.89 (5) *
WEEK 8	*	253.07 ± 4.38 (15)	252.60 ± 4.56 (5)		246.00 ± 10.5 (5)	209.20 ± 1.74 (5) *
WEEK 9		255.10 ± 5.78 (10)	257.80 ± 5.23 (5)		252.20 ± 10.4 (5)	210.60 ± 3.57 (5) *
WEEK 10		258.80 ± 5.66 (10)	263.40 ± 6.15 (5)		255.20 ± 10.1 (5)	211.60 ± 2.80 (5) *
WEEK 11		261.50 ± 5.90 (10)	272.60 ± 7.16 (5)		260.60 ± 11.0 (5)	214.40 ± 4.70 (5) *
WEEK 12		270.90 ± 5.96 (10)	276.20 ± 6.60 (5)		269.60 ± 10.8 (5)	209.40 ± 8.77 (5) *
WEEK 13		271.20 ± 6.27 (10)	276.20 ± 9.72 (5)		266.00 ± 10.7 (5)	212.40 ± 9.99 (5) *
WEEK 14		274.80 ± 8.05 (5)	277.00 ± 8.12 (5)		267.80 ± 10.3 (5)	218.20 ± 15.4 (5) *
WEEK 15		277.40 ± 8.08 (5)	282.00 ± 8.75 (5)		271.60 ± 11.7 (5)	228.40 ± 10.9 (5) *
WEEK 16		281.20 ± 7.81 (5)	287.20 ± 8.75 (5)		278.60 ± 11.5 (5)	235.80 ± 6.73 (5) *
WEEK 17		268.40 ± 8.30 (5)	275.00 ± 7.69 (5)		263.20 ± 11.1 (5)	229.40 ± 2.42 (5) *

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,

20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 42

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 %		.01 %	
			T	R	T	R
			IN DIET		IN DIET	IN DIET
WEEK 1		43.50 ± 1.96 (20)	39.40 ± 5.49 (5)		47.40 ± 6.64 (5)	14.00 ± 6.14 (5) + C
WEEK 2	*	48.75 ± 1.19 (20)	38.60 ± 5.69 (5)		44.20 ± 2.87 (5)	21.00 ± 5.07 (5) + B
WEEK 3		35.70 ± 2.89 (20)	42.20 ± 3.10 (5)		39.00 ± 5.63 (5)	19.80 ± 4.18 (5) A
WEEK 4		29.30 ± 1.80 (20)	41.40 ± 5.11 (5)		29.60 ± 4.19 (5)	12.40 ± 2.69 (5) + B
WEEK 5		22.47 ± 2.17 (15)	28.20 ± 4.71 (5)		20.00 ± 3.62 (5)	55.00 ± 3.61 (5) + D
WEEK 6		23.67 ± 1.27 (15)	22.80 ± 2.56 (5)		20.20 ± 2.40 (5)	29.40 ± .678 (5)
WEEK 7		13.93 ± 1.82 (15)	20.40 ± 2.16 (5)		17.20 ± 1.66 (5)	19.00 ± 2.95 (5)
WEEK 8		18.60 ± 2.19 (15)	26.80 ± 2.65 (5)		24.60 ± 4.58 (5)	25.60 ± 2.98 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 43

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET		IN DIET		IN DIET	
			T	R	T	R	T	R
WEEK 1		13.70 ± 1.28 (20)	20.40 ± 5.74 (5)		18.00 ± 2.21 (5)		1.60 ± 2.82 (5)	* C
WEEK 2		17.20 ± .854 (20)	15.20 ± 2.52 (5)		16.20 ± .860 (5)		3.60 ± 1.96 (5)	+ D
WEEK 3		12.40 ± 1.52 (20)	16.20 ± 4.50 (5)		14.60 ± 2.06 (5)		5.80 ± 2.48 (5)	
WEEK 4		9.55 ± .749 (20)	16.00 ± 2.79 (5)		11.00 ± 2.74 (5)		8.00 ± 2.98 (5)	
WEEK 5	*	8.27 ± 1.17 (15)	6.80 ± 1.66 (5)		14.20 ± 1.66 (5)	*	27.00 ± 4.95 (5)	* A
WEEK 6		6.53 ± .872 (15)	8.60 ± 2.14 (5)		7.60 ± 2.48 (5)		12.60 ± 2.16 (5)	
WEEK 7		5.20 ± .725 (15)	7.00 ± 1.52 (5)		7.80 ± 2.29 (5)		9.60 ± .678 (5)	
WEEK 8		8.67 ± 1.68 (15)	13.00 ± 4.66 (5)		13.00 ± 2.00 (5)		11.00 ± 2.88 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 44
EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
WEEK 1		43.50 ± 1.96 (20)	44.20 ± 3.25 (5)		46.40 ± 1.86 (5)	19.40 ± 4.42 (5) + C
WEEK 2		48.75 ± 1.19 (20)	41.60 ± 2.20 (5)		46.00 ± 2.39 (5)	20.00 ± 3.83 (5) + C
WEEK 3		35.70 ± 2.89 (20)	34.40 ± 3.36 (5)		31.40 ± 2.27 (5)	13.40 ± 2.94 (5) + B
WEEK 4		29.30 ± 1.80 (20)	27.60 ± 3.06 (5)		34.80 ± 3.80 (5)	16.60 ± 5.13 (5) * A
WEEK 5		22.47 ± 2.17 (15)	26.00 ± 2.30 (5)		21.60 ± 3.61 (5)	11.00 ± 6.36 (5) A
WEEK 6	+	23.67 ± 1.27 (15)	22.20 ± .970 (5)		22.80 ± 2.35 (5)	12.60 ± 7.12 (5)
WEEK 7		13.93 ± 1.82 (15)	18.20 ± 2.03 (5)		19.00 ± 2.86 (5)	5.20 ± 5.42 (5) A
WEEK 8		18.60 ± 2.19 (15)	18.60 ± 1.81 (5)		13.20 ± 2.01 (5)	6.00 ± 5.40 (5) B
WEEK 9	*	17.00 ± 1.67 (10)	14.40 ± 2.80 (5)		15.40 ± 2.01 (5)	.80 ± 6.55 (5)
WEEK 10		15.60 ± 1.77 (10)	16.20 ± .970 (5)		10.40 ± 1.50 (5)	2.00 ± 2.48 (4) + D
WEEK 11	+	4.90 ± 4.45 (10)	12.60 ± .980 (5)	x	13.60 ± .400 (5)	8.00 ± 1.47 (4) x
WEEK 12	*	8.80 ± 4.14 (10)	18.60 ± 1.33 (5)	* x	10.20 ± 1.36 (5)	10.75 ± 3.71 (4) x
WEEK 13	+	4.10 ± 6.66 (10)	3.60 ± 1.86 (5)	x	4.40 ± 1.57 (5)	5.25 ± 3.35 (4) x
WEEK 14		2.00 ± 2.14 (5)	11.00 ± 1.52 (5)	x	6.60 ± 2.27 (5)	12.25 ± 4.33 (4) x
WEEK 15	+	6.80 ± 2.11 (5)	4.00 ± .548 (5)		8.00 ± 1.95 (5)	10.50 ± 7.24 (4)
WEEK 16		6.80 ± 2.06 (5)	10.40 ± 1.03 (5)		6.80 ± 2.76 (5)	5.75 ± 4.87 (4)
WEEK 17		-14.80 ± .663 (5)	-15.00 ± 2.35 (5)	x	-11.00 ± 2.17 (5)	-16.50 ± 3.07 (4) x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 45

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T	R	T	R	T	R
WEEK 1		13.70 ± 1.28 (20)	20.40 ± 3.28 (5)		17.00 ± 2.88 (5)		3.80 ± 1.43 (5)	* B
WEEK 2		17.20 ± .854 (20)	16.20 ± 3.06 (5)		14.20 ± 3.48 (5)		4.20 ± 1.56 (5)	+ C
WEEK 3		12.40 ± 1.52 (20)	16.20 ± 3.79 (5)		13.00 ± 3.21 (5)		12.00 ± 1.38 (5)	
WEEK 4		9.55 ± .749 (20)	15.60 ± 2.87 (5)	* A	11.20 ± 1.59 (5)		4.80 ± 1.66 (5)	A
WEEK 5		8.27 ± 1.17 (15)	2.40 ± 2.20 (5)	B	7.20 ± 1.77 (5)		3.20 ± 1.36 (5)	A
WEEK 6		6.53 ± .872 (15)	7.80 ± 1.83 (5)		3.00 ± 2.30 (5)		7.40 ± 1.78 (5)	
WEEK 7		5.20 ± .725 (15)	4.40 ± 2.11 (5)		9.40 ± 1.63 (5)		3.40 ± 2.48 (5)	
WEEK 8		8.67 ± 1.68 (15)	3.80 ± 2.44 (5)		5.20 ± 1.24 (5)		6.80 ± 3.02 (5)	
WEEK 9		7.50 ± 1.40 (10)	5.20 ± 2.91 (5)		6.20 ± .663 (5)		1.40 ± 2.38 (5)	B
WEEK 10	*	3.70 ± .844 (10)	5.60 ± 3.17 (5)		3.00 ± 1.22 (5)		1.00 ± .837 (5)	* A
WEEK 11		2.70 ± .943 (10)	9.20 ± 1.28 (5)	*	5.40 ± 1.69 (5)		2.80 ± 2.03 (5)	
WEEK 12		9.40 ± 1.12 (10)	3.60 ± 1.72 (5)		9.00 ± 1.87 (5)		-5.00 ± 4.42 (5)	+ D
WEEK 13		.30 ± 1.30 (10)	0.00 ± 3.21 (5)	x	-3.60 ± .872 (5)	x	3.00 ± 1.79 (5)	x
WEEK 14	+	2.60 ± .678 (5)	.80 ± 3.38 (5)		1.80 ± 1.07 (5)		5.80 ± 5.83 (5)	
WEEK 15		2.60 ± 1.12 (5)	5.00 ± 2.28 (5)	x	3.80 ± 1.74 (5)	x	10.20 ± 4.53 (5)	x
WEEK 16		3.80 ± 1.24 (5)	5.20 ± 2.01 (5)	x	7.00 ± 1.95 (5)	x	7.40 ± 4.26 (5)	x
WEEK 17		-12.80 ± 1.11 (5)	-12.20 ± 2.71 (5)	x	-15.40 ± 2.14 (5)	x	-6.40 ± 4.86 (5)	x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

of removal from treatment (Tables 42 and 43). The growth rate of the rats at the 0.10% treatment level remains notably higher than that of controls throughout the remainder of the recovery period.

There is also an increase in weight gain during the first week of recovery (Week 14) for rats fed the high dose for 13 weeks (Tables 44 and 45). The increase is much smaller than that observed for rats treated for 4 weeks at this level and is not statistically significant. With females at this treatment level, the increase in weight gain is sustained and even surpassed at Weeks 15 and 16. It seems clear, however, that the recovery rate for either sex is not as high as that for rats subjected to the shorter treatment period.

Food Consumption

The condensate blend diet resulted in significantly depressed food intake by both sexes at the high dose level throughout the treatment period (Tables 46 and 47). Food intake by other groups was normal.

When the high dose rats were transferred to the condensate-free diet after 4 weeks, they responded by increasing their food intake to--and sometimes above--the levels of other groups (Tables 48 and 49). Those rats treated first for 13 weeks, however, continued to consume less food than the controls during the recovery period, significantly so for the males during Weeks 15 and 16 (Tables 50 and 51).

Daily food consumption for 13 weeks expressed in terms of grams per kilogram of body weight appears in Tables 52 and 53. During two of the 13 weeks, males at the high dose ate significantly less food than controls did for the same body weight. This occurred far more frequently in the females and to such an extent that a sex difference may be suggested from the data.

On discontinuation of the condensate blend treatment after 4 weeks at the high dose, there was an immediate and significant increase in food intake to levels above those of the controls during the first or second week (Tables 54 and 55). An increase in the rate of food intake during the recovery period was also evident in males and females treated for 13 weeks at the high dose level (Tables 56 and 57), but the increase relative to controls was not as great as after 4 weeks of the treatment. No other dose levels appeared to be affected.

The actual doses of condensate water received by the rats over the treatment period have been calculated. These appear in Tables 58 and 59.

TABLE 46
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
WEEK 1	18.5 ± .728 (8)	18.7 ± .608 (8)		19.5 ± .354 (8)		14.3 ± .585 (8)	*
WEEK 2	23.2 ± 1.27 (8)	22.4 ± .636 (8)		23.3 ± .637 (8)		16.4 ± 1.60 (8)	*
WEEK 3	24.1 ± .827 (8)	25.3 ± .611 (8)		24.5 ± .429 (8)		15.7 ± .586 (8)	*
WEEK 4	23.0 ± .914 (8)	24.8 ± .933 (8)		24.7 ± .625 (8)		16.1 ± .756 (8)	*
WEEK 5	23.8 ± .531 (6)	24.8 ± .822 (4)		24.8 ± .312 (4)		16.8 ± 1.58 (4)	*
WEEK 6	23.7 ± .698 (6)	24.4 ± .836 (4)		24.9 ± .586 (4)		15.6 ± 1.82 (4)	*
WEEK 7	23.7 ± 1.10 (6)	24.5 ± .837 (4)		24.8 ± .589 (4)		14.1 ± 1.68 (4)	*
WEEK 8	25.2 ± 1.18 (6)	26.5 ± 1.29 (4)		27.6 ± 1.34 (4)		16.7 ± 1.02 (4)	*
WEEK 9	24.7 ± 1.42 (4)	26.3 ± 1.29 (4)		28.6 ± 1.89 (4)		17.6 ± 1.18 (4)	*
WEEK 10	24.8 ± .623 (4)	25.4 ± .351 (4)		24.4 ± 1.10 (4)		16.1 ± .728 (4)	*
WEEK 11	23.2 ± .787 (4)	25.3 ± .977 (4)		24.7 ± .635 (4)		16.0 ± .745 (4)	*
WEEK 12	22.8 ± 1.44 (4)	26.9 ± 1.45 (4)		25.0 ± .523 (4)		16.8 ± .808 (4)	*
WEEK 13	24.8 ± 1.78 (4)	27.8 ± .985 (4)		25.9 ± .830 (4)		19.8 ± .533 (4)	*

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 47
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	15.7 ± .555 (8)	16.1 ± .469 (8)	16.5 ± .399 (8)	12.3 ± .315 (8) *
WEEK 2	18.1 ± .386 (8)	16.7 ± .471 (8)	18.1 ± .710 (8)	13.5 ± 1.07 (8) *
WEEK 3	17.4 ± .598 (8)	16.8 ± .481 (8)	17.5 ± .416 (8)	12.3 ± .488 (8) *
WEEK 4	17.1 ± .399 (8)	17.0 ± .692 (8)	17.9 ± .358 (8)	12.5 ± .526 (8) *
WEEK 5	16.9 ± .413 (6)	16.6 ± .790 (4)	17.1 ± .552 (4)	12.8 ± .374 (4) *
WEEK 6	16.8 ± .493 (6)	16.2 ± .772 (4)	16.4 ± .638 (4)	11.9 ± .197 (4) *
WEEK 7	16.4 ± .409 (6)	17.0 ± .456 (4)	16.6 ± .628 (4)	12.3 ± .366 (4) *
WEEK 8	17.3 ± .763 (6)	17.7 ± 1.16 (4)	21.1 ± 1.04 (4)	13.0 ± .526 (4) *
WEEK 9	17.6 ± 1.04 (4)	17.5 ± .508 (4)	20.9 ± .872 (4)	14.3 ± .250 (4) *
WEEK 10	16.3 ± .736 (4)	17.6 ± 1.12 (4)	16.3 ± .258 (4)	11.7 ± .484 (4) *
WEEK 11	15.7 ± .659 (4)	16.1 ± .883 (4)	15.8 ± .559 (4)	11.6 ± 1.02 (4) *
WEEK 12	15.9 ± .693 (4)	17.0 ± .835 (4)	16.2 ± .675 (4)	11.7 ± .990 (4) *
WEEK 13	21.1 ± 1.28 (4)	20.2 ± 1.54 (4)	20.6 ± 1.22 (4)	13.7 ± .977 (4) *

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 48
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 Z IN DIET	.01 Z IN DIET	.10 Z IN DIET
WEEK 1	18.5 ± .728 (8)	18.0 ± 2.53 (2)	19.1 ± .315 (2)	14.3 ± 1.77 (2)
WEEK 2	23.2 ± 1.27 (8)	20.6 ± .502 (2)	21.9 ± .933 (2)	13.5 ± 2.47 (2) *
WEEK 3	24.1 ± .827 (8)	25.0 ± 1.54 (2)	23.6 ± .455 (2)	15.9 ± 2.79 (2) *
WEEK 4	23.0 ± .914 (8)	27.3 ± 2.18 (2)	24.7 ± 1.14 (2)	16.3 ± 2.05 (2)
WEEK 5	23.8 ± .531 (6)	24.7 ± .723 (2)	24.3 ± 2.24 (2)	23.3 ± 2.75 (2)
WEEK 6	23.7 ± .698 (6)	23.9 ± .455 (2)	28.2 ± 3.88 (2)	25.9 ± 2.08 (2)
WEEK 7	23.7 ± 1.10 (6)	25.1 ± .805 (2)	26.5 ± .548 (2)	24.0 ± 2.68 (2)
WEEK 8	25.2 ± 1.18 (6)	28.4 ± .857 (2)	29.3 ± 3.46 (2)	25.9 ± 2.63 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 49
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	15.7 ± .555 (8)	15.1 ± .572 (2)	17.1 ± 1.26 (2)	11.2 ± .513 (2) *
WEEK 2	18.1 ± .386 (8)	16.5 ± .921 (2)	17.3 ± .175 (2)	18.2 ± .618 (2)
WEEK 3	17.4 ± .598 (8)	17.3 ± 1.38 (2)	17.9 ± .420 (2)	10.7 ± 1.66 (2) *
WEEK 4	17.1 ± .399 (8)	17.3 ± 1.03 (2)	17.1 ± .327 (2)	10.9 ± 1.70 (2) *
WEEK 5	16.9 ± .413 (6)	17.5 ± 1.20 (2)	18.5 ± 1.13 (2)	16.5 ± .420 (2)
WEEK 6	16.8 ± .493 (6)	17.5 ± .828 (2)	17.2 ± .455 (2)	22.7 ± 2.26 (2) *
WEEK 7	16.4 ± .409 (6)	18.0 ± 1.60 (2)	17.2 ± .688 (2)	15.1 ± 1.25 (2)
WEEK 8	17.3 ± .763 (6)	20.5 ± 1.70 (2)	19.5 ± 1.54 (2)	19.6 ± 1.77 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 50

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.001 % IN DIET	W	.01 % IN DIET	.10 % IN DIET
WEEK 1	18.5 ± .728 (8)	18.5 ± .968 (2)		19.7 ± .210 (2)	13.5 ± .735 (2) *
WEEK 2	23.2 ± 1.27 (8)	22.2 ± 1.35 (2)		25.5 ± .863 (2)	17.0 ± 1.57 (2)
WEEK 3	24.1 ± .827 (8)	24.5 ± 1.67 (2)		25.2 ± 1.50 (2)	15.1 ± .408 (2) *
WEEK 4	23.0 ± .914 (8)	24.0 ± 1.08 (2)		24.6 ± .630 (2)	16.3 ± 3.06 (2)
WEEK 5	23.8 ± .531 (6)	25.1 ± 1.07 (2)		24.5 ± .618 (2)	16.4 ± 3.51 (2) *
WEEK 6	23.7 ± .698 (6)	24.1 ± .222 (2)		25.8 ± .607 (2)	14.7 ± 4.20 (2) *
WEEK 7	23.7 ± 1.10 (6)	24.7 ± .863 (2)		25.3 ± 1.11 (2)	13.7 ± 3.99 (2) *
WEEK 8	25.2 ± 1.18 (6)	28.4 ± .980 (2)		27.3 ± .735 (2)	16.3 ± 2.24 (2) *
WEEK 9	24.7 ± 1.42 (4)	26.4 ± 1.52 (2)		30.0 ± 3.87 (2)	16.5 ± 2.24 (2)
WEEK 10	24.8 ± .623 (4)	25.0 ± .093 (2)		24.7 ± 2.18 (2)	16.0 ± 1.81 (2) *
WEEK 11	23.2 ± .787 (4)	25.6 ± 1.47 (2)		25.8 ± .338 (2)	15.7 ± 1.75 (2) *
WEEK 12	22.8 ± 1.44 (4)	27.7 ± 2.03 (2)		25.7 ± .187 (2)	16.7 ± 1.92 (2)
WEEK 13	24.8 ± 1.78 (4)	27.4 ± .723 (2)		26.5 ± 1.07 (2)	19.9 ± .206 (2)
WEEK 14	27.4 ± 2.27 (2)	30.3 ± 1.89 (2)		30.5 ± 4.15 (2)	21.3 ± .247 (2)
WEEK 15	25.3 ± .432 (2)	24.9 ± .513 (2)		25.0 ± .700 (2)	20.8 ± .701 (2) *
WEEK 16	26.4 ± 3.62 (2)	24.7 ± .315 (2)		23.6 ± .117 (2)	19.0 ± 1.09 (2) *
WEEK 17	26.2 ± 3.14 (2)	26.2 ± 2.29 (2)		26.6 ± .604 (2)	20.2 ± 1.47 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 51

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	15.7 ± .555 (8)	16.7 ± .677 (2)	17.2 ± .023 (2)	12.9 ± .420 (2)
WEEK 2	18.1 ± .386 (8)	16.4 ± .758 (2)	18.7 ± .058 (2)	12.5 ± 1.25 (2) *
WEEK 3	17.4 ± .598 (8)	17.3 ± .012 (2)	18.6 ± .210 (2)	12.6 ± .187 (2) *
WEEK 4	17.1 ± .399 (8)	19.0 ± .665 (2)	18.4 ± 1.07 (2)	12.8 ± .420 (2) *
WEEK 5	16.9 ± .413 (6)	17.2 ± .362 (2)	17.2 ± 1.18 (2)	12.2 ± .420 (2) *
WEEK 6	16.8 ± .493 (6)	16.4 ± .385 (2)	16.3 ± 1.54 (2)	11.7 ± .327 (2) *
WEEK 7	16.4 ± .409 (6)	16.7 ± .152 (2)	17.2 ± 1.32 (2)	11.8 ± .595 (2) *
WEEK 8	17.3 ± .763 (6)	18.1 ± .910 (2)	21.9 ± .956 (2)	12.5 ± .956 (2) *
WEEK 9	17.6 ± 1.04 (4)	18.0 ± .233 (2)	21.7 ± .233 (2)	14.1 ± .128 (2)
WEEK 10	16.3 ± .736 (4)	18.2 ± 1.12 (2)	16.4 ± .607 (2)	11.1 ± .618 (2) *
WEEK 11	15.7 ± .659 (4)	16.4 ± .012 (2)	16.5 ± .863 (2)	10.4 ± .886 (2) *
WEEK 12	15.9 ± .693 (4)	17.0 ± .117 (2)	16.4 ± 1.04 (2)	10.6 ± 1.83 (2) *
WEEK 13	21.1 ± 1.28 (4)	21.2 ± 1.21 (2)	21.6 ± 1.63 (2)	12.2 ± 1.00 (2) *
WEEK 14	19.9 ± 3.44 (2)	19.0 ± .035 (2)	22.3 ± 1.48 (2)	15.1 ± 3.71 (2)
WEEK 15	16.5 ± .898 (2)	16.5 ± .012 (2)	17.2 ± 1.32 (2)	15.8 ± .152 (2)
WEEK 16	15.4 ± .408 (2)	16.3 ± .991 (2)	16.4 ± 1.57 (2)	14.8 ± .828 (2)
WEEK 17	17.8 ± .776 (2)	17.2 ± 1.12 (2)	17.5 ± 2.31 (2)	15.1 ± 1.52 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 52
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	98.3 ± 1.47 (8)	100.0 ± 2.24 (8)	98.7 ± .530 (8)	90.2 ± 2.71 (8) *
WEEK 2	97.5 ± 3.03 (8)	96.8 ± 1.60 (8)	95.9 ± 2.16 (8)	91.3 ± 9.74 (8)
WEEK 3	88.4 ± 1.89 (8)	93.3 ± 1.41 (8)	88.0 ± 1.54 (8)	78.7 ± .806 (8) *
WEEK 4	75.9 ± 2.19 (8)	82.0 ± 2.83 (8)	79.1 ± 1.62 (8)	75.3 ± 1.94 (8)
WEEK 5	73.3 ± 1.23 (6)	76.8 ± 3.90 (4)	73.7 ± .712 (4)	74.2 ± 2.97 (4)
WEEK 6	67.9 ± 2.27 (6)	70.8 ± 2.70 (4)	69.9 ± 1.70 (4)	65.1 ± 3.59 (4)
WEEK 7	65.4 ± 2.39 (6)	67.7 ± 2.87 (4)	66.0 ± 1.46 (4)	57.7 ± 2.56 (4)
WEEK 8	66.1 ± 2.53 (6)	69.9 ± 4.43 (4)	70.9 ± 3.44 (4)	66.6 ± 2.48 (4)
WEEK 9	63.0 ± 2.50 (4)	66.7 ± 3.69 (4)	70.5 ± 4.18 (4)	69.4 ± 3.74 (4)
WEEK 10	60.9 ± 2.32 (4)	62.4 ± .760 (4)	58.8 ± 2.29 (4)	57.4 ± .747 (4)
WEEK 11	56.2 ± .685 (4)	60.3 ± 2.68 (4)	57.7 ± 1.46 (4)	55.6 ± 1.03 (4)
WEEK 12	53.8 ± 1.21 (4)	61.5 ± 3.53 (4)	56.8 ± 1.24 (4)	56.8 ± 2.10 (4)
WEEK 13	57.8 ± 1.72 (4)	62.7 ± 2.31 (4)	58.0 ± 1.73 (4)	65.2 ± 3.38 (4)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 53
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	85.3 ± 1.89 (8)	87.2 ± 1.63 (8)	92.3 ± 2.01 (8)	75.9 ± 1.37 (8) *
WEEK 2	90.2 ± 1.76 (8)	83.5 ± 1.21 (8)	93.2 ± 3.32 (8)	81.5 ± 7.40 (8)
WEEK 3	81.8 ± 2.01 (8)	79.6 ± 1.29 (8)	84.7 ± 1.59 (8)	68.9 ± 1.79 (8) *
WEEK 4	77.0 ± 1.11 (8)	74.7 ± 2.11 (8)	82.2 ± 1.65 (8)	67.8 ± 2.09 (8) *
WEEK 5	72.6 ± 1.41 (6)	70.7 ± 1.68 (4)	76.1 ± 1.35 (4)	66.9 ± 2.03 (4)
WEEK 6	70.3 ± 2.39 (6)	65.7 ± 1.84 (4)	71.8 ± 1.45 (4)	60.2 ± 1.03 (4) *
WEEK 7	66.9 ± 1.18 (6)	68.4 ± .860 (4)	70.6 ± .579 (4)	60.4 ± 1.40 (4) *
WEEK 8	68.1 ± 2.09 (6)	69.9 ± 2.28 (4)	87.7 ± 5.00 (4)	62.4 ± 2.59 (4)
WEEK 9	68.8 ± 3.15 (4)	67.9 ± 1.11 (4)	84.6 ± 3.64 (4)	67.4 ± 2.09 (4)
WEEK 10	62.7 ± 1.78 (4)	67.0 ± 2.29 (4)	65.0 ± .738 (4)	54.5 ± 1.50 (4) *
WEEK 11	59.8 ± 1.68 (4)	59.7 ± 1.10 (4)	61.4 ± 1.15 (4)	53.0 ± 3.79 (4)
WEEK 12	58.5 ± 1.62 (4)	62.3 ± 1.12 (4)	61.4 ± 1.47 (4)	54.0 ± 3.42 (4)
WEEK 13	77.8 ± 4.51 (4)	73.1 ± 4.00 (4)	78.1 ± 3.05 (4)	62.0 ± 3.04 (4) *

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 54
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	98.3 ± 1.47 (8)	97.5 ± 10.6 (2)	98.6 ± .708 (2)	87.3 ± 3.03 (2)
WEEK 2	97.5 ± 3.03 (8)	92.4 ± 1.50 (2)	91.8 ± 3.28 (2)	73.2 ± 4.40 (2) *
WEEK 3	88.4 ± 1.89 (8)	94.2 ± 3.75 (2)	85.3 ± 1.01 (2)	78.0 ± 2.48 (2)
WEEK 4	75.9 ± 2.19 (8)	88.9 ± 5.76 (2)	80.5 ± .486 (2)	75.7 ± .074 (2)
WEEK 5	73.3 ± 1.23 (6)	73.8 ± 1.45 (2)	74.3 ± 1.87 (2)	86.0 ± 1.42 (2) *
WEEK 6	67.9 ± 2.27 (6)	67.0 ± 1.26 (2)	82.4 ± 17.3 (2)	86.3 ± 1.16 (2)
WEEK 7	65.4 ± 2.39 (6)	66.4 ± 2.47 (2)	73.3 ± 6.36 (2)	75.0 ± 1.24 (2)
WEEK 8	66.1 ± 2.53 (6)	70.2 ± 3.14 (2)	76.6 ± 15.7 (2)	74.9 ± 1.02 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 55
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	85.3 ± 1.89 (8)	83.5 ± 3.20 (2)	96.6 ± 7.24 (2)	71.8 ± 1.80 (2)
WEEK 2	90.2 ± 1.76 (8)	84.3 ± 3.56 (2)	89.4 ± .566 (2)	114.1 ± 7.23 (2) *
WEEK 3	81.8 ± 2.01 (8)	81.5 ± 3.61 (2)	86.1 ± 1.68 (2)	64.6 ± 6.53 (2) *
WEEK 4	77.0 ± 1.11 (8)	75.9 ± 2.30 (2)	78.1 ± .328 (2)	62.7 ± 5.73 (2) *
WEEK 5	72.6 ± 1.41 (6)	74.3 ± 2.19 (2)	79.6 ± 6.20 (2)	82.4 ± 4.29 (2)
WEEK 6	70.3 ± 2.39 (6)	71.8 ± .956 (2)	71.6 ± 2.58 (2)	106.5 ± 11.7 (2) *
WEEK 7	66.9 ± 1.18 (6)	71.6 ± 4.09 (2)	69.3 ± 2.21 (2)	67.9 ± 6.02 (2)
WEEK 8	68.1 ± 2.09 (6)	77.7 ± 1.59 (2)	74.6 ± 4.71 (2)	84.1 ± 8.97 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 56

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT.)/DAY)
OF MALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	98.3 ± 1.47 (8)	100.0 ± 1.10 (2)	98.5 ± .004 (2)	84.8 ± 2.63 (2) *
WEEK 2	97.5 ± 3.03 (8)	97.8 ± 2.30 (2)	103.5 ± 4.21 (2)	95.5 ± 14.6 (2)
WEEK 3	88.4 ± 1.89 (8)	93.8 ± 1.31 (2)	90.8 ± 6.38 (2)	78.7 ± 3.13 (2)
WEEK 4	75.9 ± 2.19 (8)	82.9 ± .481 (2)	78.8 ± 2.40 (2)	77.1 ± 6.73 (2)
WEEK 5	73.3 ± 1.23 (6)	80.0 ± 6.84 (2)	73.2 ± .987 (2)	73.4 ± 5.91 (2)
WEEK 6	67.9 ± 2.27 (6)	71.6 ± 3.43 (2)	72.3 ± 1.53 (2)	61.8 ± 7.37 (2)
WEEK 7	65.4 ± 2.39 (6)	69.5 ± 4.63 (2)	67.2 ± 2.06 (2)	56.5 ± 5.61 (2)
WEEK 8	66.1 ± 2.53 (6)	76.0 ± 5.35 (2)	70.2 ± .808 (2)	67.8 ± 5.18 (2)
WEEK 9	63.0 ± 2.50 (4)	58.2 ± 5.82 (2)	73.9 ± 8.11 (2)	69.2 ± 8.59 (2)
WEEK 10	60.9 ± 2.32 (4)	61.7 ± 1.23 (2)	59.4 ± 4.23 (2)	56.4 ± 1.35 (2)
WEEK 11	56.2 ± .685 (4)	61.5 ± 4.92 (2)	60.2 ± .230 (2)	54.0 ± 1.31 (2)
WEEK 12	53.8 ± 1.21 (4)	63.6 ± 5.74 (2)	58.5 ± 1.09 (2)	55.4 ± .955 (2)
WEEK 13	57.8 ± 1.72 (4)	62.4 ± 2.87 (2)	59.9 ± 1.39 (2)	65.3 ± 5.11 (2)
WEEK 14	60.5 ± 4.72 (2)	67.2 ± 5.06 (2)	67.7 ± 8.50 (2)	66.9 ± 5.19 (2)
WEEK 15	54.9 ± .518 (2)	54.8 ± .353 (2)	54.6 ± 1.02 (2)	63.1 ± 4.14 (2) *
WEEK 16	56.5 ± 6.96 (2)	53.2 ± .146 (2)	50.7 ± .242 (2)	56.5 ± 4.18 (2)
WEEK 17	57.8 ± 6.03 (2)	58.4 ± 6.28 (2)	58.6 ± 1.66 (2)	63.5 ± 5.02 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 57

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE RATS DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	85.3 ± 1.89 (8)	89.7 ± 4.90 (2)	94.0 ± 2.08 (2)	77.2 ± 2.66 (2)
WEEK 2	90.2 ± 1.76 (8)	81.1 ± 2.06 (2)	95.1 ± 2.83 (2)	73.0 ± 6.77 (2) *
WEEK 3	81.8 ± 2.01 (8)	79.3 ± .508 (2)	88.7 ± 2.75 (2)	68.8 ± .129 (2) *
WEEK 4	77.0 ± 1.11 (8)	81.1 ± 3.90 (2)	83.1 ± .906 (2)	67.9 ± 2.11 (2) *
WEEK 5	72.6 ± 1.41 (6)	72.8 ± .878 (2)	75.2 ± 1.47 (2)	63.8 ± 1.36 (2) *
WEEK 6	70.3 ± 2.39 (6)	67.1 ± .480 (2)	70.1 ± 2.61 (2)	58.7 ± 1.28 (2)
WEEK 7	66.9 ± 1.18 (6)	67.1 ± .434 (2)	71.3 ± .694 (2)	58.3 ± 1.33 (2) *
WEEK 8	68.1 ± 2.09 (6)	71.7 ± 2.21 (2)	89.5 ± 9.16 (2)	59.5 ± 4.53 (2)
WEEK 9	68.8 ± 3.15 (4)	69.8 ± .046 (2)	86.4 ± 5.90 (2)	66.8 ± 1.95 (2)
WEEK 10	62.7 ± 1.78 (4)	69.2 ± 3.22 (2)	64.3 ± 1.16 (2)	52.5 ± 2.20 (2) *
WEEK 11	59.8 ± 1.68 (4)	60.1 ± 1.25 (2)	63.4 ± .042 (2)	48.3 ± 3.08 (2) *
WEEK 12	58.5 ± 1.62 (4)	61.6 ± .619 (2)	60.7 ± .367 (2)	50.3 ± 5.87 (2)
WEEK 13	77.8 ± 4.51 (4)	77.0 ± 6.32 (2)	81.0 ± 1.50 (2)	57.5 ± .900 (2)
WEEK 14	71.8 ± 8.78 (2)	68.5 ± 1.30 (2)	83.1 ± 1.15 (2)	68.3 ± 11.7 (2)
WEEK 15	59.6 ± .318 (2)	58.6 ± 1.33 (2)	63.1 ± 1.33 (2)	69.5 ± 2.97 (2) *
WEEK 16	54.9 ± 1.28 (2)	56.7 ± 2.23 (2)	58.8 ± 1.91 (2)	62.7 ± 1.73 (2) *
WEEK 17	66.4 ± .648 (2)	62.5 ± 2.32 (2)	66.2 ± 4.81 (2)	66.0 ± 6.74 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

Table 58

DOSES OF CONDENSATE WATER [mg/kg (body weight)/day] IN DIETS
CONSUMED BY MALE RATS DURING 13 WEEKS OF TREATMENT

Week	Treatment Groups*		
	0.001% in Diet	0.01% in Diet	0.10% in Diet
1	0.82	8.0	63.1
2	0.80	8.3	63.9
3	0.80	7.0	68.5
4	0.58	6.6	65.5
5	0.55	6.1	64.6
6	0.50	5.8	56.6
7	0.48	6.3	53.1
8	0.49	6.8	61.3
9	0.48	4.5	46.5
10	0.44	3.7	38.5
11	0.43	3.7	37.3
12	0.49	4.6	48.8
13	0.50	4.6	56.1
Average Dose	0.57	4.2	55.6

* Daily food consumption x analytical concentration
of condensate water in the feed.

Table 59

DOSES OF CONDENSATE WATER [mg/kg (body weight)/day] IN DIETS
CONSUMED BY FEMALE RATS DURING 13 WEEKS OF TREATMENT

Week	Treatment Groups*		
	0.001% in Diet	0.01% in Diet	0.10% in Diet
1	0.71	7.9	53.1
2	0.68	8.0	57.1
3	0.69	6.7	59.9
4	0.53	6.8	60.0
5	0.50	6.3	58.2
6	0.47	6.0	52.4
7	0.48	6.8	55.6
8	0.49	8.5	57.4
9	0.48	5.4	45.2
10	0.48	4.1	36.5
11	0.43	3.8	35.5
12	0.49	4.9	46.4
13	<u>0.73</u>	<u>6.2</u>	<u>53.3</u>
Average Dose	0.54	6.3	51.6

* Daily food consumption x analytical concentration
of condensate water in the feed.

Organ Weights

Organ weights and organ-to-body and organ-to-brain weight ratios for rats killed after 4 weeks of treatment are given in Tables 60 and 61. The spleens of both sexes at the 0.10% treatment level were significantly enlarged (the spleen-to-body weight ratio for females at the 0.01% level was also cited statistically but the value was not abnormally high). Testes weights at the high-dose level were clearly reduced. Although liver-to-body weight ratios for both sexes at the 0.01 and 0.10% levels are indicated statistically to be high, the liver-to-brain weight ratios were unaltered relative to controls. Kidney weights and kidney-to-brain weight ratios tended to be lower at the 0.10% level than control values, but not to a point where an effect of treatment on these parameters was clearly evident.

After 13 weeks of treatment, the same alterations at the 0.10% level were observed (Tables 62 and 63). Spleen and testes weights were changed to about the same degrees as after 4 weeks of treatment. There were no statistically significant alterations at the 0.01 and 0.001% condensate blend levels.

The organ weight data for rats killed after 4 weeks of treatment and 4 weeks of recovery are contained in Tables 64 and 65. The testes weights and weight ratios at the 0.10% condensate blend level were significantly low, indicating incomplete reversal of this treatment effect. The kidney-to-body weight ratio for females at this level was significantly high but the kidney-to-brain weight ratio was normal. Since all other organ-to-body weight ratios tended to be high, this elevation probably resulted from the low body weight for this group and not from a lingering effect of treatment directly on the kidneys. No other alterations were evident.

The data for rats killed after 13 weeks of treatment and 4 weeks of recovery are in Tables 66 and 67. A number of differences are cited statistically at the 0.10% level, including severely atrophied testes. All other alterations in both male and female values at this level stemmed from the lower body weights of the animals compared with controls. The hearts of females at the 0.10% level were significantly higher than those of controls, but since the heart-to-brain weight ratio was not similarly altered and since there was no clear dose response with either parameter (Appendix D, Table D-6), the toxicological significance of this observation is unclear.

Hematology

The hematological determinations on the blood from rats killed after 4 weeks of treatment appear in Tables 68 and 69. Males at the high dose level had significantly low RBC and high WBC, MCV, and MCH; females had low hemoglobin and MCHC and high MCV. The erythrocyte

TABLE 60

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
FINAL WEIGHT		299.40 ± 11.4 (5)	307.20 ± 10.0 (5)		308.20 ± 10.8 (5)	219.20 ± 15.0 (5) + A
BRAIN		1.96 ± .028 (5)	1.97 ± .042 (5)		2.05 ± .037 (5)	1.92 ± .052 (5)
HEART		1.27 ± .199 (5)	1.29 ± .056 (5)		1.20 ± .083 (5)	1.06 ± .108 (5)
LIVER		13.76 ± .904 (5)	16.16 ± .805 (5)		17.35 ± 1.37 (5)	12.12 ± 1.05 (5)
SPLEEN		.65 ± .040 (5)	.79 ± .053 (5)		.80 ± .057 (5)	1.42 ± .141 (5) + D
KIDNEYS		2.67 ± .194 (5)	2.89 ± .125 (5)		2.87 ± .129 (5)	2.07 ± .182 (5)
TESTES		2.69 ± .093 (5)	2.75 ± .115 (5)		2.58 ± .036 (5)	.88 ± .042 (5) + D
BRAIN/BODY		6.58 ± .228 (5)	6.43 ± .134 (5)		6.67 ± .175 (5)	8.85 ± .423 (5) + B
HEART/BODY		4.26 ± .664 (5)	4.21 ± .192 (5)		3.89 ± .208 (5)	4.81 ± .317 (5)
LIVER/BODY		45.81 ± 1.62 (5)	52.59 ± 2.07 (5)		55.99 ± 2.88 (5) *	55.10 ± 1.53 (5) +
SPLEEN/BODY		2.18 ± .119 (5)	2.57 ± .098 (5)		2.61 ± .165 (5)	6.44 ± .193 (5) + D
KIDNEYS/BODY		8.89 ± .338 (5)	9.39 ± .103 (5)		9.32 ± .217 (5)	9.41 ± .293 (5)
TESTES/BODY		9.00 ± .215 (5)	8.95 ± .332 (5)		8.40 ± .242 (5)	4.07 ± .206 (5) + C
HEART/BRAIN		.65 ± .093 (5)	.65 ± .022 (5)		.59 ± .036 (5)	.55 ± .049 (5)
LIVER/BRAIN		7.02 ± .466 (5)	8.21 ± .403 (5)		8.43 ± .576 (5)	6.31 ± .454 (5)
SPLEEN/BRAIN		.33 ± .020 (5)	.40 ± .024 (5)	B	.39 ± .024 (5)	.74 ± .061 (5) + D
KIDNEYS/BRAIN		1.36 ± .099 (5)	1.47 ± .046 (5)		1.40 ± .052 (5)	1.08 ± .077 (5)
TESTES/BRAIN	*	1.37 ± .045 (5)	1.40 ± .060 (5)		1.26 ± .013 (5)	.46 ± .021 (5) + D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 61

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
FINAL WEIGHT		216.00 ± 5.52 (5)	220.20 ± 4.28 (5)		219.60 ± 2.42 (5)		192.40 ± 5.26 (5)	*
BRAIN		2.05 ± .054 (5)	1.97 ± .049 (5)		2.01 ± .031 (5)		1.97 ± .067 (5)	
HEART		.86 ± .039 (5)	.91 ± .031 (5)		.94 ± .038 (5)		.77 ± .031 (5)	A
LIVER		8.38 ± .447 (5)	8.75 ± .293 (5)		9.43 ± .249 (5)		8.78 ± .248 (5)	
SPLEEN		.53 ± .027 (5)	.56 ± .016 (5)		.65 ± .029 (5)	B	.95 ± .056 (5)	+ D
KIDNEYS		1.76 ± .076 (5)	1.68 ± .065 (5)		1.88 ± .027 (5)		1.46 ± .054 (5)	*
BRAIN/BODY		9.49 ± .206 (5)	8.98 ± .350 (5)		9.18 ± .180 (5)		10.25 ± .266 (5)	
HEART/BODY		3.99 ± .094 (5)	4.16 ± .188 (5)		4.29 ± .144 (5)		4.02 ± .115 (5)	
LIVER/BODY		38.72 ± 1.15 (5)	39.70 ± .858 (5)		42.94 ± .891 (5)	*	45.66 ± .406 (5)	+ A
SPLEEN/BODY	*	2.43 ± .080 (5)	2.53 ± .062 (5)		2.98 ± .146 (5)	*	4.94 ± .256 (5)	+ D
KIDNEYS/BODY		8.15 ± .213 (5)	7.63 ± .205 (5)		8.54 ± .086 (5)		7.61 ± .223 (5)	
HEART/BRAIN		.42 ± .017 (5)	.46 ± .005 (5)		.47 ± .018 (5)	A	.39 ± .006 (5)	
LIVER/BRAIN		4.09 ± .167 (5)	4.45 ± .218 (5)		4.68 ± .119 (5)		4.47 ± .099 (5)	
SPLEEN/BRAIN		.26 ± .009 (5)	.28 ± .014 (5)	A	.33 ± .016 (5)	B	.48 ± .031 (5)	+ D
KIDNEYS/BRAIN		.86 ± .025 (5)	.86 ± .042 (5)		.93 ± .024 (5)		.75 ± .031 (5)	A

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 62

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
FINAL WEIGHT	+	411.40 ± 43.2 (5)	448.80 ± 4.32 (5)		452.00 ± 3.32 (5)	302.20 ± 15.9 (5)
BRAIN		2.13 ± .067 (5)	2.23 ± .066 (5)		2.27 ± .062 (5)	2.00 ± .056 (5)
HEART	*	1.38 ± .145 (5)	1.48 ± .069 (5)		1.51 ± .029 (5)	1.19 ± .068 (5)
LIVER	*	15.67 ± 2.76 (5)	17.24 ± .642 (5)		19.93 ± .876 (5)	17.94 ± .823 (5)
SPLEEN		.71 ± .089 (5)	.78 ± .030 (5)		.92 ± .066 (5)	1.52 ± .079 (5) + D
KIDNEYS	*	3.26 ± .399 (5)	3.20 ± .124 (5)		3.63 ± .087 (5)	2.63 ± .093 (5)
TESTES	+	3.01 ± .215 (5)	2.67 ± .625 (5)		3.06 ± .091 (5)	1.05 ± .061 (5) + D
BRAIN/BODY	*	5.40 ± .547 (5)	4.98 ± .171 (5)		5.02 ± .123 (5)	6.66 ± .317 (5)
HEART/BODY		3.37 ± .165 (5)	3.29 ± .144 (5)		3.33 ± .058 (5)	3.93 ± .115 (5)
LIVER/BODY		36.46 ± 4.11 (5)	38.39 ± 1.30 (5)		44.07 ± 1.77 (5)	59.67 ± 2.49 (5) + B
SPLEEN/BODY		1.71 ± .094 (5)	1.73 ± .062 (5)		2.04 ± .155 (5)	5.05 ± .244 (5) + D
KIDNEYS/BODY		7.86 ± .269 (5)	7.14 ± .251 (5)		8.03 ± .194 (5)	8.79 ± .524 (5)
TESTES/BODY	+	7.48 ± .388 (5)	5.95 ± 1.39 (5)		6.78 ± .238 (5)	3.51 ± .289 (5) + C
HEART/BRAIN		.64 ± .056 (5)	.66 ± .037 (5)		.67 ± .022 (5)	.60 ± .036 (5)
LIVER/BRAIN	*	7.22 ± 1.17 (5)	7.73 ± .273 (5)		8.81 ± .467 (5)	8.99 ± .366 (5)
SPLEEN/BRAIN		.33 ± .035 (5)	.35 ± .019 (5)		.41 ± .039 (5)	.76 ± .041 (5) + D
KIDNEYS/BRAIN	*	1.52 ± .153 (5)	1.44 ± .059 (5)		1.60 ± .056 (5)	1.32 ± .037 (5)
TESTES/BRAIN	+	1.41 ± .065 (5)	1.20 ± .281 (5)		1.35 ± .058 (5)	.52 ± .024 (5) + D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D, RATIO TEST CANNOT BE CALCULATED - X.

TABLE 63

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET	T R	IN DIET	T R	IN DIET	T R
FINAL WEIGHT		270.20 ± 10.7 (5)	275.80 ± 13.9 (5)		260.40 ± 9.41 (5)		229.80 ± 4.04 (5)	
BRAIN		2.09 ± .034 (5)	2.10 ± .022 (5)		2.11 ± .051 (5)		2.03 ± .038 (5)	
HEART		.96 ± .034 (5)	1.03 ± .043 (5)		.93 ± .044 (5)		.85 ± .032 (5)	A
LIVER		9.14 ± .312 (5)	9.81 ± .734 (5)		9.51 ± .217 (5)		10.88 ± .481 (5)	
SPLEEN		.53 ± .065 (5)	.56 ± .028 (5)		.57 ± .019 (5)		1.04 ± .066 (5)	+ D
KIDNEYS		1.94 ± .095 (5)	1.95 ± .074 (5)		1.94 ± .069 (5)		1.74 ± .079 (5)	
BRAIN/BODY		7.76 ± .247 (5)	7.70 ± .397 (5)		8.13 ± .207 (5)		8.85 ± .177 (5)	
HEART/BODY		3.57 ± .215 (5)	3.75 ± .156 (5)		3.58 ± .155 (5)		3.72 ± .119 (5)	
LIVER/BODY		33.93 ± 1.15 (5)	35.46 ± 1.26 (5)		36.66 ± 1.17 (5)		47.25 ± 1.39 (5)	+ B
SPLEEN/BODY		1.94 ± .157 (5)	2.03 ± .068 (5)		2.18 ± .074 (5)		4.52 ± .220 (5)	+ D
KIDNEYS/BODY		7.21 ± .317 (5)	7.10 ± .195 (5)		7.44 ± .158 (5)		7.55 ± .242 (5)	
HEART/BRAIN		.46 ± .024 (5)	.49 ± .025 (5)		.44 ± .013 (5)		.42 ± .012 (5)	
LIVER/BRAIN		4.38 ± .181 (5)	4.66 ± .340 (5)		4.51 ± .144 (5)		5.35 ± .193 (5)	
SPLEEN/BRAIN	*	.25 ± .028 (5)	.27 ± .014 (5)		.27 ± .006 (5)		.51 ± .035 (5)	+ B
KIDNEYS/BRAIN		.93 ± .039 (5)	.93 ± .034 (5)		.92 ± .026 (5)		.86 ± .036 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 64

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000X/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
FINAL WEIGHT			404.60 ± 9.36 (5)		388.60 ± 18.0 (5)	345.00 ± 21.4 (5)
BRAIN			2.11 ± .047 (5)		2.04 ± .093 (5)	2.09 ± .050 (5)
HEART			1.46 ± .064 (5)		1.29 ± .092 (5)	1.36 ± .045 (5)
LIVER	*		16.29 ± .264 (5)		16.36 ± 1.51 (5)	15.13 ± .930 (5)
SPLEEN			.80 ± .080 (5)		.78 ± .080 (5)	.77 ± .082 (5)
KIDNEYS			3.11 ± .166 (5)		3.23 ± .196 (5)	2.88 ± .116 (5)
TESTES			3.00 ± .114 (5)		3.20 ± .185 (5)	2.01 ± .125 (5) + A
BRAIN/BODY			5.43 ± .84 (5)		5.27 ± .214 (5)	6.14 ± .287 (5)
HEART/BODY			3.76 ± .157 (5)		3.31 ± .125 (5)	3.99 ± .216 (5)
LIVER/BODY			41.91 ± 1.04 (5)		41.81 ± 2.23 (5)	43.97 ± 1.45 (5)
SPLEEN/BODY			2.07 ± .215 (5)		2.00 ± .172 (5)	2.25 ± .233 (5)
KIDNEYS/BODY			7.98 ± .293 (5)		8.30 ± .258 (5)	8.40 ± .247 (5)
TESTES/BODY	*		7.72 ± .309 (5)		8.29 ± .618 (5)	5.83 ± .094 (5) * A
HEART/BRAIN			.69 ± .035 (5)		.63 ± .038 (5)	.65 ± .025 (5)
LIVER/BRAIN			7.74 ± .213 (5)		7.98 ± .514 (5)	7.23 ± .411 (5)
SPLEEN/BRAIN			.38 ± .038 (5)		.38 ± .036 (5)	.37 ± .039 (5)
KIDNEYS/BRAIN			1.48 ± .079 (5)		1.58 ± .054 (5)	1.38 ± .039 (5)
TESTES/BRAIN			1.42 ± .045 (5)		1.56 ± .052 (5)	.96 ± .045 (5) + B

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A.
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 65

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000X/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
FINAL WEIGHT		264.00 ± 6.60 (5)	263.40 ± 10.4 (5)		261.60 ± 5.93 (5)	233.60 ± 3.17 (5)
BRAIN		2.04 ± .067 (5)	2.01 ± .035 (5)		1.98 ± .023 (5)	2.01 ± .059 (5)
HEART		1.01 ± .050 (5)	1.01 ± .064 (5)		.89 ± .039 (5)	.86 ± .033 (5)
LIVER		9.90 ± .413 (5)	9.97 ± .620 (5)		9.15 ± .450 (5)	9.75 ± .471 (5)
SPLEEN		.55 ± .036 (5)	.57 ± .041 (5)		.57 ± .038 (5)	.58 ± .034 (5)
KIDNEYS		1.82 ± .052 (5)	1.91 ± .094 (5)		1.88 ± .087 (5)	1.87 ± .046 (5)
BRAIN/BODY		7.72 ± .200 (5)	7.70 ± .422 (5)		7.57 ± .238 (5)	8.61 ± .233 (5)
HEART/BODY		3.84 ± .222 (5)	3.81 ± .113 (5)		3.41 ± .200 (5)	3.68 ± .094 (5)
LIVER/BODY		37.44 ± .722 (5)	37.73 ± .888 (5)		34.93 ± 1.30 (5)	41.68 ± 1.46 (5)
SPLEEN/BODY		2.09 ± .126 (5)	2.16 ± .123 (5)		2.18 ± .136 (5)	2.46 ± .127 (5)
KIDNEYS/BODY		6.90 ± .133 (5)	7.27 ± .251 (5)		7.19 ± .206 (5)	7.99 ± .125 (5) +
HEART/BRAIN		.50 ± .031 (5)	.50 ± .036 (5)		.45 ± .016 (5)	.43 ± .016 (5) A
LIVER/BRAIN		4.86 ± .160 (5)	4.97 ± .343 (5)		4.63 ± .235 (5)	4.86 ± .224 (5)
SPLEEN/BRAIN		.27 ± .012 (5)	.28 ± .021 (5)		.29 ± .018 (5)	.29 ± .018 (5)
KIDNEYS/BRAIN		.90 ± .027 (5)	.95 ± .050 (5)		.96 ± .052 (5)	.93 ± .034 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST: CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

★ CONFIDENCE LEVEL = .95
+ CONFIDENCE LEVEL = .99

95% CONFIDENCE LEVEL = .99
BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

CONFIDENCE INTERVAL

TABLE 67
EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000X/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 Z IN DIET		.01 Z IN DIET		.10 Z IN DIET	
			T R	T R	T R	T R	T R	
FINAL WEIGHT		268.40 ± 8.30 (5)	275.00 ± 7.69 (5)	263.20 ± 11.1 (5)	229.40 ± 2.42 (5)	*		
BRAIN		1.95 ± .032 (5)	2.04 ± .091 (5)	2.09 ± .088 (5)	2.08 ± .050 (5)			
HEART	*	.93 ± .056 (5)	1.20 ± .149 (5)	1.11 ± .071 (5)	1.16 ± .032 (5)	*		
LIVER		7.11 ± .464 (5)	7.79 ± .508 (5)	7.23 ± .414 (5)	7.63 ± .127 (5)			
SPLEEN	*	.57 ± .043 (5)	.61 ± .148 (5)	.57 ± .042 (5)	.54 ± .026 (5)			
KIDNEYS		1.95 ± .096 (5)	2.02 ± .090 (5)	1.91 ± .044 (5)	1.91 ± .114 (5)			
BRAIN/BODY		7.29 ± .250 (5)	7.42 ± .309 (5)	7.99 ± .374 (5)	9.05 ± .151 (5)	+ A		
HEART/BODY		3.46 ± .137 (5)	4.33 ± .474 (5)	4.24 ± .254 (5)	5.04 ± .163 (5)	+ A		
LIVER/BODY		26.39 ± 1.05 (5)	28.25 ± 1.44 (5)	27.48 ± 1.05 (5)	33.29 ± .640 (5)	+ A		
SPLEEN/BODY	+	2.12 ± .115 (5)	2.21 ± .523 (5)	2.15 ± .105 (5)	2.34 ± .111 (5)			
KIDNEYS/BODY		7.26 ± .222 (5)	7.34 ± .256 (5)	7.30 ± .232 (5)	8.36 ± .581 (5)			
HEART/BRAIN		.48 ± .029 (5)	.59 ± .063 (5)	B .53 ± .020 (5)	.56 ± .021 (5)	A		
LIVER/BRAIN		3.66 ± .269 (5)	3.83 ± .258 (5)	3.45 ± .115 (5)	3.68 ± .085 (5)			
SPLEEN/BRAIN	+	.29 ± .024 (5)	.31 ± .085 (5)	.27 ± .012 (5)	.26 ± .015 (5)			
KIDNEYS/BRAIN		1.00 ± .056 (5)	.99 ± .049 (5)	.92 ± .029 (5)	.93 ± .078 (5)			

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 68

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 %		.01 %	
			IN DIET	T R	IN DIET	T R
RBC (X 10 ⁶)	*	6.50 ± .092 (5)	6.61 ± .214 (5)		6.88 ± .406 (5)	5.33 ± .119 (5) + A
HGB (G %)	*	13.84 ± .147 (5)	14.24 ± .577 (5)		13.48 ± .320 (5)	13.52 ± .139 (5)
HCT (%)	*	36.40 ± .400 (5)	38.40 ± 1.50 (5)		40.80 ± 1.98 (5)	35.00 ± .548 (5)
MCV (U) ³		57.20 ± .583 (5)	59.40 ± .812 (5)		58.80 ± .860 (5)	66.00 ± 1.76 (5) +
MCH (UG)		21.40 ± .245 (5)	21.20 ± .374 (5)		19.86 ± .980 (5)	26.00 ± .633 (5) + A
MCHC (%)		38.00 ± .633 (5)	37.00 ± .775 (5)		33.60 ± 1.72 (5)	39.40 ± .600 (5)
WBC (X 10 ³)	*	7.80 ± .486 (5)	9.44 ± .896 (5)		9.24 ± .874 (5)	19.42 ± 2.77 (5) + B
PMN (%)		16.00 ± 1.92 (5)	14.20 ± 2.29 (5)		16.80 ± 1.83 (5)	22.40 ± 3.08 (5)
BANDS (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)
LYMPH (%)	*	76.40 ± .510 (5)	78.40 ± 2.32 (5)		77.60 ± 2.32 (5)	70.00 ± 2.88 (5)
ATYP LYMPH(%)		3.40 ± 1.08 (5)	3.00 ± .548 (5)		1.20 ± .800 (5)	3.60 ± .927 (5)
MONO (%)		3.20 ± .583 (5)	3.20 ± .200 (5)		3.80 ± .374 (5)	3.00 ± .316 (5)
EOSIN (%)		1.00 ± .316 (5)	1.20 ± .200 (5)		.60 ± .245 (5)	.60 ± .245 (5)
BASO (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)
RETICS (%)	+	.74 ± .178 (5)	.68 ± .102 (5)		1.12 ± .271 (5)	24.96 ± 1.18 (5) + D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 69

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET	T R	.01 % IN DIET	T R	.10 % IN DIET	T R
RBC (X 10 ⁶)	*	6.60 ± .111 (5)	6.82 ± .523 (5)		6.51 ± .152 (5)		5.85 ± .290 (5)	
HGB (G %)		14.46 ± .189 (5)	14.10 ± .430 (5)		13.82 ± .246 (5)		12.76 ± .370 (5)	*
HCT (Z)	*	34.80 ± .860 (5)	36.00 ± 2.88 (5)		34.40 ± .600 (5)		34.60 ± 1.21 (5)	
MCV (U)3		53.60 ± .510 (5)	54.00 ± .633 (5)		54.20 ± .490 (5)		60.20 ± 1.46 (5)	+
MCH (UUC)	*	21.80 ± .200 (5)	21.00 ± 1.10 (5)		20.80 ± .200 (5)	*	21.80 ± .860 (5)	
MCHC (Z)	*	41.80 ± .663 (5)	40.20 ± 2.03 (5)		39.80 ± .200 (5)	*	37.00 ± .949 (5)	*
WBC (X 10 ³)		9.02 ± 1.14 (5)	5.82 ± .877 (5)	A	7.58 ± .765 (5)		7.48 ± .745 (5)	
PMN (Z)		12.20 ± 1.16 (5)	12.00 ± 1.05 (5)		17.40 ± 1.54 (5)		14.00 ± 1.30 (5)	
BANDS (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	
LYMPH (Z)		78.20 ± 1.20 (5)	81.60 ± 1.29 (5)		75.20 ± 1.02 (5)		78.20 ± 1.28 (5)	
ATYP LYMPH(Z)	*	2.60 ± .245 (5)	1.20 ± 1.20 (5)		3.60 ± .400 (5)		2.60 ± .748 (5)	
MONO (Z)		3.40 ± .245 (5)	4.00 ± .548 (5)		3.20 ± .374 (5)		4.00 ± .316 (5)	
EOSIN (Z)	*	3.60 ± .872 (5)	1.20 ± .735 (5)		.60 ± .245 (5)	* D	1.20 ± .200 (5)	C
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	
RETICS (Z)	+	.58 ± .143 (5)	.68 ± .097 (5)		1.70 ± .210 (5)	*	24.80 ± 1.77 (5)	+ D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

count for these females was also on the low side, though not significantly so. Reticulocytes were extremely high at the high dose level for both sexes and were also significantly elevated for females at the 0.01% level. Red blood cells from the high-dose rats exhibited a marked polychromasia and moderate hypochromia. Occasional nucleated red blood cells and a few Heinz bodies were seen in almost all high-dose blood specimens but in almost no others. The decreased MCHC value for females at the high dose suggested a dose relationship to treatment, but this was not confirmed by linear trend analysis (Appendix D, Table D-7). The low MCH and eosinophils also cited statistically for these females are apparently isolated variations in these parameters and are not attributable to the treatment.

Hematological data on the rats killed 9 weeks later appear in Tables 70 and 71. In addition to the above findings, the males at the 0.10% level now had significantly low hemoglobin; the females continued to show the low hemoglobin. The percent atypical lymphocytes for the latter was high. MCHC for females showed the same trend as before, but the differences were no longer significant. The most notable difference in hematological data between the two sacrifice periods was the much lower percent reticulocytes in the rats at the 0.10% condensate blend level after 9 additional weeks of treatment. Slight polychromasia and Heinz bodies were seen in about half of the specimens but otherwise the blood was normal.

Values for rats allowed a 4-week recovery period are given in Tables 72 through 75. There is no evidence of anemia persisting in the recovery animals. Red blood cells were normal. Slight elevations in Hgb, Hct, and MCV were observed in rats at the high dose, significant for male Hgb and MCV after 4 weeks of treatment followed by recovery, which is probably due to the compensatory mechanism.

Clinical Chemistry

Clinical chemistry data for rats killed after 4 weeks of treatment are presented in Tables 76 and 77 and for those killed after 13 weeks in Tables 78 and 79. There were marginal effects on some parameters at the high dose, e.g., serum transaminases and glucose (statistically indicated in some instances), but values were within normal limits with one exception--the high triglyceride level in sera at the 0.10% condensate blend level of males killed after 13 weeks of treatment. This parameter was also high for females at this level relative to controls and for males at the 0.01% level, but neither value was abnormal.

Rats at the high dose at both Week 4 and Week 13 sacrifices had lower glucose than controls did, but the significance is obscured by the fact that these animals were not fasted prior to sacrifice. Transaminase levels tended to be higher in these animals, particularly

TABLE 70

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 Z IN DIET	T R	.01 Z IN DIET	T R
RBC (X 10 ⁶)		8.04 ± .305 (4)	7.56 ± .109 (5)		8.06 ± .303 (5)	6.26 ± .366 (5) + A
HGB (G Z)		14.70 ± .356 (4)	14.28 ± .222 (5)		13.64 ± .108 (5)	12.96 ± .256 (5) +
HCT (Z)		42.50 ± 1.04 (4)	39.00 ± .837 (5)		41.00 ± 1.67 (5)	37.80 ± 1.59 (5)
MCV (U) ³		54.00 ± 1.63 (4)	53.20 ± .490 (5)		52.20 ± .490 (5)	61.40 ± .927 (5) +
MCH (UUG)	*	18.25 ± .250 (4)	18.60 ± .245 (5)		17.40 ± .678 (5)	20.80 ± .970 (5)
MCHC (Z)		34.50 ± .957 (4)	36.60 ± .872 (5)		32.60 ± 1.75 (5)	34.00 ± 1.05 (5)
WBC (X 10 ³)		4.78 ± .756 (4)	7.00 ± .547 (5)		7.80 ± .940 (5)	14.24 ± .941 (5) + D
PHN (Z)		20.50 ± 2.22 (4)	14.40 ± 4.08 (5)		18.00 ± 3.11 (5)	14.00 ± 2.85 (5)
BANDS (Z)		0.00 ± 0.00 (4)	.40 ± .400 (5)	x	.20 ± .200 (5)	.40 ± .245 (5) x
LYMPH (Z)		73.25 ± 3.07 (4)	81.20 ± 4.73 (5)		80.20 ± 3.64 (5)	82.20 ± 2.91 (5)
ATYP LYMPH(Z)	*	1.50 ± 1.19 (4)	1.00 ± .316 (5)	x	.20 ± .200 (5)	.80 ± .374 (5) x
MONO (Z)		4.25 ± .629 (4)	2.60 ± .510 (5)		.80 ± .200 (5)	* D 2.20 ± .860 (5) A
EOSIN (Z)		.50 ± .289 (4)	.40 ± .245 (5)	x	.60 ± .400 (5)	.40 ± .400 (5) x
BASO (Z)		0.00 ± 0.00 (4)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)
RETICS (Z)	*	1.98 ± .466 (4)	1.62 ± .310 (5)		1.90 ± .377 (5)	4.28 ± 1.19 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A.

20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 71
EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 Z IN DIET	T R	.01 Z IN DIET	.10 Z IN DIET
RBC (X 106)		7.32 ± .216 (5)	7.47 ± .131 (5)		7.30 ± .312 (5)	6.33 ± .231 (5)
HGB (G Z)		14.36 ± .254 (5)	14.38 ± .256 (5)		13.80 ± .141 (5)	13.14 ± .186 (5) +
HCT (Z)		37.60 ± .872 (5)	38.20 ± .490 (5)		38.40 ± 1.66 (5)	38.40 ± 1.91 (5)
MCV (U)3	*	52.40 ± .245 (5)	52.20 ± .583 (5)		53.40 ± .812 (5)	61.60 ± 1.63 (5) *
MCH (UUG)		19.20 ± .374 (5)	19.40 ± .245 (5)		19.40 ± .678 (5)	21.20 ± .800 (5)
MCHC (Z)	*	38.00 ± .316 (5)	38.60 ± .812 (5)		36.80 ± 1.46 (5)	35.20 ± 1.62 (5)
WBC (X 103)		6.64 ± .454 (5)	6.14 ± .779 (5)		5.34 ± .727 (5)	9.92 ± 1.23 (5)
PMN (Z)		14.40 ± 1.86 (5)	12.40 ± 1.03 (5)		18.20 ± 1.88 (5)	16.00 ± 1.52 (5)
BANDS (Z)		.40 ± .400 (5)	0.00 ± 0.00 (5)	x	0.00 ± 0.00 (5)	.20 ± .200 (5) x
LYMPH (Z)		81.80 ± 2.42 (5)	82.80 ± 1.69 (5)		75.80 ± 1.62 (5)	75.40 ± 1.60 (5)
ATYP LYMPH(Z)		.40 ± .400 (5)	.40 ± .245 (5)	x	2.20 ± .735 (5)	3.80 ± .583 (5) + x
MONO (Z)		2.40 ± .748 (5)	3.40 ± .400 (5)		3.20 ± .583 (5)	3.80 ± .583 (5)
EOSIN (Z)		.60 ± .600 (5)	1.00 ± .316 (5)	x	.60 ± .400 (5)	.80 ± .374 (5) x
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)
RETICS (Z)	*	1.64 ± .387 (5)	1.48 ± .186 (5)		1.68 ± .377 (5)	4.88 ± .860 (5) *

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95
+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A.
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 72

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
RBC (X 10 ⁶)		7.59 ± .541 (4)	6.88 ± .114 (4)		7.80 ± .258 (5)	7.71 ± .358 (5)
HGB (G Z)		14.38 ± .296 (4)	14.25 ± .275 (4)		14.02 ± .204 (5)	15.64 ± .144 (5) *
HCT (Z)		40.75 ± 2.25 (4)	36.75 ± 1.11 (4)		40.60 ± 1.60 (5)	44.60 ± 2.46 (5)
MCV (U) ³		54.50 ± 1.32 (4)	54.25 ± 1.38 (4)		52.80 ± .490 (5)	58.60 ± .980 (5)
MCH (UUG)		19.25 ± 1.20 (4)	21.08 ± .210 (4)		18.00 ± .447 (5)	20.80 ± .800 (5)
MCHC (Z)		35.87 ± 1.97 (4)	39.55 ± 1.16 (4)		34.80 ± 1.32 (5)	35.80 ± 1.77 (5)
WBC (X 10 ³)		7.59 ± 1.17 (4)	6.75 ± .572 (4)		6.82 ± .785 (5)	12.02 ± 1.62 (5)
PMN (Z)		17.25 ± 2.39 (4)	16.25 ± 2.10 (4)		16.80 ± 3.44 (5)	14.60 ± 1.03 (5)
BANDS (Z)		0.00 ± 0.00 (4)	.75 ± .479 (4)	x	0.00 ± 0.00 (5)	0.00 ± 0.00 (5) x
LYMPH (Z)		76.25 ± 3.12 (4)	76.50 ± 2.25 (4)		78.80 ± 3.65 (5)	77.60 ± 1.17 (5)
ATYP LYMPH(Z)		1.00 ± .408 (4)	1.25 ± .629 (4)	x	1.20 ± .583 (5)	2.60 ± .400 (5) x
MONO (Z)		4.75 ± 1.44 (4)	4.00 ± 1.22 (4)		2.80 ± .663 (5)	5.00 ± 0.00 (5)
EOSIN (Z)	*	.75 ± .479 (4)	1.25 ± .947 (4)	x	.40 ± .245 (5)	.20 ± .200 (5) x
BASO (Z)		0.00 ± 0.00 (4)	0.00 ± 0.00 (4)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)
RETICS (Z)		1.15 ± .050 (4)	1.20 ± .082 (4)		1.34 ± .075 (5)	.96 ± .133 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 73

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET	T R	IN DIET	T R	IN DIET	T R
RBC (X 106)		6.96 ± .114 (5)	7.52 ± .272 (5)		7.20 ± .218 (5)		7.19 ± .277 (5)	
HGB (G %)		14.26 ± .225 (5)	13.78 ± .260 (5)		14.62 ± .322 (5)		14.72 ± .248 (5)	
HCT (%)		36.60 ± .678 (5)	38.80 ± 1.59 (5)		37.60 ± 1.03 (5)		39.80 ± 1.77 (5)	
MCV (U)3		53.40 ± .600 (5)	52.40 ± .510 (5)		53.60 ± .400 (5)		56.40 ± .400 (5)	+
MCH (UUG)		20.40 ± .200 (5)	18.86 ± .824 (5)		20.00 ± .447 (5)		20.40 ± .600 (5)	
MCHC (%)	*	39.00 ± .316 (5)	36.60 ± 1.91 (5)		38.60 ± .678 (5)		37.60 ± 1.17 (5)	
WBC (X 103)		6.54 ± .536 (5)	7.54 ± 1.20 (5)		9.37 ± 1.22 (5)		8.99 ± 1.05 (5)	
PMN (%)		11.60 ± 2.20 (5)	11.20 ± 1.66 (5)		8.80 ± 1.11 (5)		13.00 ± 1.52 (5)	
BANDS (%)		.40 ± .245 (5)	2.20 ± .490 (5)	+ x	.20 ± .200 (5)	x	0.00 ± 0.00 (5)	x
LYMPH (%)		83.80 ± 1.74 (5)	82.00 ± 1.84 (5)		87.80 ± .800 (5)		80.60 ± 1.78 (5)	
ATYP LYMPH(%)		1.40 ± .400 (5)	.80 ± .200 (5)		1.40 ± .245 (5)		1.80 ± .490 (5)	
MONO (%)		2.20 ± .374 (5)	3.80 ± .583 (5)		1.60 ± .245 (5)		4.20 ± .374 (5)	*
EOSIN (%)		.20 ± .200 (5)	0.00 ± 0.00 (5)	x	.20 ± .200 (5)	x	.40 ± .245 (5)	x
BASO (%)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	
RETICS (%)		.92 ± .080 (5)	1.75 ± .206 (4)	+ B	1.88 ± .080 (5)	+ C	.80 ± .110 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 74

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
RBC (X 10 ⁶)		7.97 ± .098 (4)	8.17 ± .100 (5)		8.16 ± .079 (5)	8.11 ± .175 (4)
HGB (G %)	*	15.07 ± .309 (4)	15.42 ± .263 (5)		15.52 ± .156 (5)	15.55 ± .877 (4)
HCT (%)		40.75 ± 1.11 (4)	40.80 ± .663 (5)		41.00 ± .548 (5)	43.50 ± .957 (4)
MCV (U)3		52.00 ± .913 (4)	50.80 ± .583 (5)		51.40 ± .600 (5)	54.50 ± 1.19 (4)
MCH (UUG)	*	19.00 ± .408 (4)	19.00 ± .447 (5)		19.20 ± .200 (5)	19.25 ± 1.18 (4)
MCHC (%)		36.25 ± 1.11 (4)	38.40 ± .748 (5)		38.20 ± .583 (5)	35.50 ± 1.55 (4)
WBC (X 10 ³)		5.96 ± .309 (4)	6.94 ± 1.24 (5)		8.24 ± 1.57 (5)	8.54 ± 1.18 (4)
PMN (%)		21.00 ± 3.39 (4)	21.00 ± 3.11 (5)		17.40 ± 4.45 (5)	16.50 ± 1.66 (4)
BANDS (%)		0.00 ± 0.00 (4)	.20 ± .200 (5)	x	.20 ± .200 (5)	0.00 ± 0.00 (4)
LYMPH (%)		73.25 ± 2.90 (4)	74.80 ± 2.33 (5)		77.80 ± 3.80 (5)	79.00 ± .913 (4)
ATYP LYMPH(%)		1.50 ± .645 (4)	.80 ± .374 (5)		1.00 ± .548 (5)	1.25 ± .629 (4)
MONO (%)		3.50 ± .866 (4)	2.40 ± .812 (5)		2.00 ± .633 (5)	2.25 ± .947 (4)
EOSIN (%)		.75 ± .479 (4)	.80 ± .374 (5)	x	1.60 ± .678 (5)	1.00 ± .408 (4)
BASO (%)		0.00 ± 0.00 (4)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (4)
RETICS (%)		1.20 ± .141 (4)	.93 ± .149 (4)	+	-0.00 ± *.00 (-0)	1.06 ± *.00 (8)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A.
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 75

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
RBC (X 10 ⁶)		7.73 ± .204 (5)	7.15 ± .201 (5)		7.68 ± .073 (5)	7.73 ± .130 (4)
HGB (G %)	*	15.44 ± .231 (5)	14.34 ± .453 (5)		15.20 ± .152 (5)	15.98 ± .103 (4)
HCT (Z)		40.20 ± .916 (5)	36.80 ± 1.07 (5)		39.00 ± .447 (5)	42.25 ± .250 (4)
MCV (U)3		53.00 ± .447 (5)	52.00 ± .316 (5)		52.00 ± .548 (5)	55.25 ± 1.03 (4)
MCH (UUG)		20.00 ± .316 (5)	20.00 ± 0.00 (5)		20.00 ± .316 (5)	20.75 ± .479 (4)
MCHC (Z)		38.60 ± .600 (5)	39.40 ± .245 (5)		39.40 ± .400 (5)	37.75 ± .250 (4)
WBC (X 10 ³)		6.36 ± .717 (5)	5.88 ± 1.21 (5)		6.50 ± .823 (5)	8.36 ± .675 (4)
PMN (Z)		33.40 ± 6.79 (5)	16.80 ± 4.55 (5)	A	17.80 ± 2.44 (5)	14.25 ± 3.40 (4)
BANDS (Z)		.40 ± .245 (5)	.40 ± .400 (5)	x	.40 ± .400 (5)	.25 ± .250 (4)
LYMPH (Z)		61.60 ± 6.35 (5)	77.00 ± 3.51 (5)		73.00 ± 2.77 (5)	76.75 ± 2.25 (4)
ATYP LYMPH(Z)		1.60 ± .510 (5)	3.40 ± 1.21 (5)		4.00 ± .447 (5)	2.75 ± .479 (4)
MONO (Z)		2.20 ± .800 (5)	1.20 ± .200 (5)		3.60 ± .678 (5)	5.25 ± 1.03 (4)
EOSIN (Z)	*	1.40 ± .245 (5)	1.40 ± .748 (5)		1.20 ± .200 (5)	.75 ± .250 (4)
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (5)		0.00 ± 0.00 (5)	0.00 ± 0.00 (4)
RETICS (Z)		2.22 ± .206 (5)	2.25 ± .506 (4)	+	-0.00 ± *.00 (-0)	2.23 ± *.00 (9)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x .

TABLE 76

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
ALBUMIN (MGZ)		4.56 ± .186 (5)	5.24 ± .197 (5)		4.94 ± .221 (5)	5.34 ± .121 (5)
ALK-P (IU/L)		301.60 ± 29.8 (5)	262.00 ± 18.1 (5)		264.20 ± 17.1 (5)	218.00 ± 26.1 (5)
BUN (MG Z)		23.00 ± .633 (5)	22.20 ± .735 (5)		24.20 ± .800 (5)	24.20 ± 1.07 (5)
CA (MG Z)		9.28 ± .180 (5)	8.52 ± .524 (5)		8.02 ± .845 (5)	11.76 ± .367 (5) *
CHOL (MG Z)		42.00 ± 4.57 (5)	50.40 ± 1.86 (5)		55.00 ± 2.95 (5)	64.80 ± 4.22 (5) + B
CREAT (MG Z)		.60 ± .032 (5)	.64 ± .024 (5)		.62 ± .037 (5)	.62 ± .020 (5)
GLUCOSE (MGZ)		192.20 ± 9.35 (5)	189.60 ± 3.47 (5)		184.00 ± 4.45 (5)	162.60 ± 10.9 (5)
P (MG Z)		9.38 ± .477 (5)	10.40 ± .803 (5)		9.96 ± .453 (5)	11.88 ± .399 (5) *
LDH (IU/L)		867.80 ± 34.1 (5)	724.60 ± 36.5 (5)		736.60 ± 74.0 (5)	914.00 ± 95.5 (5)
TRIG (MG Z)	*	126.20 ± 11.2 (5)	161.20 ± 6.24 (5)	*	188.00 ± 36.9 (5)	199.80 ± 29.8 (5)
URIC ACID(MGZ)	*	2.28 ± .128 (5)	1.72 ± .102 (5)	*	2.34 ± .206 (5)	3.68 ± .503 (5) *
PROTEIN (MGZ)		7.08 ± .369 (5)	7.96 ± .262 (5)		7.12 ± .396 (5)	6.88 ± .116 (5)
SGPT (IU/L)		39.20 ± 3.87 (5)	35.80 ± 1.16 (5)		43.20 ± 6.15 (5)	48.40 ± 3.33 (5)
SGOT(IU/L)		129.80 ± 12.3 (5)	110.60 ± 5.35 (5)		135.80 ± 22.0 (5)	143.80 ± 9.84 (5)
BILI (MG Z)		.71 ± .050 (5)	.63 ± .061 (5)		.70 ± .166 (5)	.84 ± .172 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X .

TABLE 77

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
ALBUMIN (MGZ)		5.72 ± .074 (5)	5.52 ± .139 (5)		5.64 ± .112 (5)	4.88 ± .159 (5) +
ALK-P (IU/L)	*	191.00 ± 30.8 (5)	207.80 ± 20.8 (5)		186.20 ± 5.77 (5)	196.20 ± 39.8 (5)
BUN (MG Z)		22.80 ± 1.20 (5)	21.40 ± .748 (5)		18.60 ± .678 (5)	22.80 ± .735 (5)
CA (MG Z)		12.42 ± .174 (5)	12.18 ± .248 (5)		11.50 ± .202 (5)	11.20 ± .351 (5) *
CHOL (MG Z)		75.80 ± 5.36 (5)	64.80 ± 4.28 (5)		68.60 ± 4.41 (5)	56.60 ± 10.6 (5)
CREAT (MG Z)		.66 ± .040 (5)	.78 ± .037 (5)	A	.64 ± .024 (5)	.58 ± .020 (5) A
GLUCOSE (MGZ)		183.60 ± 4.65 (5)	217.00 ± 10.1 (5)	*	177.40 ± 6.37 (5)	156.00 ± 4.10 (5)
P (MG Z)		8.52 ± .263 (5)	8.34 ± .319 (5)		8.70 ± .503 (5)	7.62 ± .462 (5)
LDH (IU/L)		614.40 ± 64.2 (5)	570.40 ± 108. (5)		817.20 ± 115. (5)	778.00 ± 62.2 (5)
TRIG (MG Z)		91.40 ± 15.4 (5)	92.60 ± 18.9 (5)		111.40 ± 22.6 (5)	112.40 ± 23.2 (5)
URIC ACID(MGZ)		2.56 ± .163 (5)	2.46 ± .431 (5)		2.36 ± .246 (5)	3.80 ± .230 (5)
PROTEIN (MGZ)	*	7.46 ± .117 (5)	7.10 ± .205 (5)		7.16 ± .024 (5)	6.72 ± .276 (5)
SGPT (IU/L)	*	30.60 ± 2.58 (5)	33.40 ± 6.52 (5)		27.80 ± 1.39 (5)	41.00 ± 1.52 (5) *
SGOT(IU/L)		115.80 ± 10.1 (5)	123.80 ± 14.8 (5)		117.20 ± 13.4 (5)	125.80 ± 9.10 (5)
BILI (MG Z)		1.09 ± .062 (5)	.76 ± .170 (5)		.88 ± .059 (5)	.90 ± .148 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,

20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X .

TABLE 78
EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
ALBUMIN (MGZ)		4.82 ± .125 (4)	4.78 ± .107 (5)		4.48 ± .183 (5)	4.68 ± .102 (5)
ALK-P (IU/L)		191.75 ± 23.0 (4)	160.60 ± 23.1 (5)		159.80 ± 9.31 (5)	182.00 ± 20.8 (5)
BUN (MG Z)		20.00 ± .577 (4)	18.60 ± .872 (5)		19.00 ± .447 (5)	25.40 ± .872 (5) + A
CA (MG Z)	*	9.00 ± .123 (4)	8.86 ± .284 (5)		9.20 ± .063 (5)	9.58 ± .254 (5)
CHOL (MG Z)		46.00 ± 4.92 (4)	39.80 ± 2.78 (5)		33.80 ± 2.15 (5)	43.00 ± 1.95 (5)
CREAT (MG Z)		.60 ± 0.00 (4)	.56 ± .040 (5)		.56 ± .024 (5)	.70 ± .127 (5)
GLUCOSE (MGZ)		193.75 ± 12.8 (4)	190.00 ± 7.18 (5)		173.20 ± 9.56 (5)	159.20 ± 8.71 (5)
P (MG Z)		8.48 ± 1.19 (4)	4.46 ± 1.15 (5)	B	7.56 ± .380 (5)	9.28 ± .658 (5)
LDH (IU/L)		670.00 ± 46.6 (4)	494.40 ± 67.4 (5)		729.60 ± 92.1 (5)	733.00 ± 81.0 (5)
TRIG (MG Z)	*	179.25 ± 20.7 (4)	168.20 ± 9.42 (5)		241.00 ± 32.0 (5)	383.00 ± 74.4 (5) *
URIC ACID(MGZ)		1.42 ± .298 (4)	1.06 ± .136 (5)		.88 ± .206 (5)	1.30 ± .285 (5)
PROTEIN (MGZ)		6.22 ± .180 (4)	6.06 ± .169 (5)		6.34 ± .150 (5)	6.28 ± .097 (5)
SGPT (IU/L)	*	29.00 ± .913 (4)	25.60 ± 1.69 (5)		32.20 ± 3.50 (5)	41.20 ± 4.79 (5)
SGOT(IU/L)	*	90.00 ± 23.7 (4)	57.60 ± 3.80 (5)		92.60 ± 6.76 (5)	134.60 ± 19.8 (5)
BILI (MG Z)		.70 ± .089 (4)	.62 ± .032 (5)		.57 ± .025 (5)	.61 ± .040 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X .

TABLE 79

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T R		T R		T R	
ALBUMIN (MG%)		4.98 ± .168 (5)	5.10 ± .270 (5)		5.52 ± .273 (5)		4.82 ± .312 (5)	
ALK-P (IU/L)		154.80 ± 11.3 (5)	144.60 ± 17.6 (5)		135.20 ± 13.1 (5)		147.40 ± 20.5 (5)	
BUN (MG %)		22.60 ± .678 (5)	22.80 ± 1.07 (5)		21.40 ± 2.04 (5)		24.60 ± 1.03 (5)	
CA (MG %)		9.84 ± .206 (5)	10.04 ± .183 (5)		10.14 ± .154 (5)		9.62 ± .244 (5)	
CHOL (MG %)		51.00 ± 3.42 (5)	43.40 ± 1.86 (5)		48.40 ± 1.69 (5)		55.20 ± 3.93 (5)	
CREAT (MG %)		.60 ± .032 (5)	.60 ± .032 (5)		.58 ± .020 (5)		.48 ± .037 (5)	
GLUCOSE (MG%)		157.20 ± 6.95 (5)	181.00 ± 2.88 (5)		188.80 ± 8.66 (5)		149.40 ± 10.0 (5)	
P (MG %)		7.50 ± .895 (5)	6.44 ± .250 (5)		5.28 ± .364 (5)	A	6.76 ± .519 (5)	
LDH (IU/L)		580.00 ± 68.2 (5)	512.60 ± 75.9 (5)		452.80 ± 71.8 (5)		528.40 ± 52.2 (5)	
TRIG (MG %)		117.20 ± 15.8 (5)	143.80 ± 17.1 (5)		140.00 ± 35.2 (5)		179.40 ± 33.5 (5)	
URIC ACID(MG%)		1.46 ± .136 (5)	1.90 ± .416 (5)		1.52 ± .390 (5)		1.72 ± .252 (5)	
PROTEIN (MG%)		6.90 ± .187 (5)	6.66 ± .246 (5)		6.92 ± .143 (5)		5.96 ± .163 (5)	
SGPT (IU/L)		55.80 ± 8.06 (5)	71.80 ± 5.88 (5)		46.40 ± 10.2 (5)		48.00 ± 8.58 (5)	
SGOT(IU/L)		71.40 ± 5.49 (5)	92.80 ± 13.3 (5)		86.80 ± 11.5 (5)		101.00 ± 11.1 (5)	
BILI (MG %)	*	.43 ± .022 (5)	.51 ± .030 (5)		.65 ± .100 (5)		.73 ± .155 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

in those at the high dose killed after 13 weeks of treatment; however, none of the values were abnormal, and we were unable to establish a dose-response relationship (Appendix D, Table D-8).

The combination of high serum Ca^{2+} and phosphorus in 4-week treated males at the high dose is possibly treatment-related. Uric acid was elevated in both sexes at this level (significantly so for males) after 4 weeks but not after 13 weeks. All other observations cited statistically in Tables 74 through 77 show no patterns clearly related to the treatment.

None of these tendencies persisted in rats allowed a 4-week recovery period (Tables 80 through 83) to a degree that suggested a lingering effect of treatment, except possibly for the triglyceride levels of males at the 0.01 and 0.10% condensate blend levels. Even these values were well within the normal range. All recovery groups at the 0.10% level, except males treated for 4 weeks only, did have significantly high phosphorus compared with controls. This was also true for males at this level who were killed after 4 weeks of treatment without a recovery period (Table 74). The frequency with which this difference occurred among high dose groups, particularly those allowed recovery, suggests that a high serum phosphorus may be related to the treatment. Several other parameters were statistically altered, particularly for males treated at the high dose for 13 weeks before recovery (Table 80), but none of the cited values were outside the normal range (Appendix E, Table E-3). Creatinine values for all male treatment groups at the 17-week sacrifice were significantly low but since (a) low creatinine was not seen at any other time or in female groups, (b) there was no statistically demonstrable dose response, and (c) the values were not outside normal limits, no toxicological significance was attached to this observation.

Histopathology

The microscopic lesions found in rats killed after 4 weeks of treatment are listed in Tables 84 and 85. All five males at the 0.10% condensate blend level had testicular atrophy, with atrophy of the epididymi and (for 4 of the 5 males) moderate focal interstitial cell hyperplasia. Four of these males (none of the females) had hemosiderosis of the spleen. All five females at the 0.10% level had moderate hyperplasia of the uterus. No other lesion appeared in the treated groups with a high enough frequency or in a dose-related manner to permit ascribing it to the treatment.

After 13 weeks of treatment, all 5 males at the high dose had testicular atrophy accompanied by aspermia in the epididymi (Table 86). All males and females in each group, including control groups, had hemosiderosis of the spleen (Tables 86 and 87). The severity of this lesion increased progressively with the dose, suggesting that this condition was treatment related. At the low (0.001%) dose level, no

TABLE 80

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.00% Z IN DIET	T R	.01% Z IN DIET	T R
ALBUMIN (MGZ)	*	4.28 ± .139 (5)	4.40 ± .045 (5)		4.43 ± .025 (4)	4.56 ± .121 (5)
ALK-P (IU/L)		171.40 ± 19.7 (5)	166.00 ± 23.3 (5)		187.50 ± 15.6 (4)	141.60 ± 8.86 (5)
BUN (MG Z)		19.60 ± 2.29 (5)	23.20 ± .735 (5)		20.50 ± 2.22 (4)	19.60 ± 1.75 (5)
CA (MG Z)		9.46 ± .513 (5)	10.16 ± .147 (5)		9.77 ± .794 (4)	9.78 ± .585 (5)
CHOL (MG Z)		49.40 ± 3.39 (5)	46.00 ± 1.22 (5)		54.25 ± 3.73 (4)	55.60 ± 4.53 (5)
CREAT (MG Z)		.58 ± .049 (5)	.54 ± .075 (5)		.60 ± 0.00 (4)	.62 ± .020 (5)
GLUCOSE (MGZ)		220.60 ± 13.1 (5)	211.80 ± 10.1 (5)		222.25 ± 9.80 (4)	221.40 ± 7.53 (5)
P (MG Z)		8.82 ± .340 (5)	8.98 ± .318 (5)		8.63 ± .193 (4)	9.04 ± .527 (5)
LDH (IU/L)	*	574.00 ± 59.0 (5)	461.80 ± 146. (5)		631.25 ± 53.9 (4)	228.80 ± 27.4 (5) * C
TRIG (MG Z)		157.40 ± 27.9 (5)	197.80 ± 16.1 (5)		142.75 ± 26.1 (4)	149.40 ± 23.0 (5)
URIC ACID(MGZ)		2.04 ± .293 (5)	1.74 ± .117 (5)		2.10 ± .367 (4)	2.16 ± .364 (5)
PROTEIN (MGZ)		5.28 ± .191 (5)	5.50 ± .207 (5)		6.50 ± .212 (4) *	6.26 ± .221 (5) *
SGPT (IU/L)	+	28.60 ± 1.17 (5)	28.00 ± 1.48 (5)		34.50 ± 1.50 (4) *	43.60 ± 10.7 (5)
SGOT(IU/L)	*	92.60 ± 14.1 (5)	84.80 ± 18.1 (5)		80.50 ± 2.25 (4)	105.80 ± 23.8 (5)
BILI (MG Z)		.77 ± .042 (5)	1.01 ± .074 (5)		.88 ± .152 (4)	.69 ± .056 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10% - A,
20% - B, 35% - C, 50% - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 81

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
ALBUMIN (MGZ)	*	4.96 ± .183 (5)	4.50 ± .283 (5)		5.04 ± .172 (5)	5.16 ± .040 (5)
ALK-P (IU/L)		152.80 ± 28.7 (5)	123.00 ± 15.4 (5)		96.20 ± 12.9 (5)	145.00 ± 21.9 (5)
BUN (MG Z)		26.00 ± 1.41 (5)	21.00 ± 3.81 (5)		22.00 ± 2.21 (5)	18.20 ± 2.25 (5)
CA (MG Z)	*	10.82 ± .201 (5)	11.26 ± .334 (5)		12.24 ± .081 (5)	10.64 ± .693 (5)
CHOL (MG Z)		86.20 ± 3.38 (5)	74.40 ± 4.77 (5)		63.80 ± 2.03 (5)	63.40 ± 7.16 (5) * A
CREAT (MG Z)		.70 ± .045 (5)	.70 ± .032 (5)		.72 ± .049 (5)	.64 ± .024 (5)
GLUCOSE (MGZ)		180.80 ± 6.51 (5)	227.80 ± 7.60 (5)	+ A	218.80 ± 12.1 (5)	185.20 ± 4.77 (5)
P (MG Z)		6.94 ± .163 (5)	7.18 ± .385 (5)		7.88 ± .289 (5)	8.96 ± .393 (5) + A
LDH (IU/L)		377.40 ± 97.3 (5)	300.40 ± 21.8 (5)		508.20 ± 106. (5)	525.00 ± 80.4 (5)
TRIG (MG Z)	+	160.20 ± 9.38 (5)	161.80 ± 43.2 (5)		73.20 ± 10.8 (5)	96.20 ± 5.61 (5) + B
URIC ACID(MGZ)		2.10 ± .164 (5)	2.66 ± .199 (5)		2.34 ± .336 (5)	2.20 ± .348 (5)
PROTEIN (MGZ)		7.76 ± .513 (5)	6.36 ± .291 (5)		6.80 ± .267 (5)	7.18 ± .393 (5)
SGPT (IU/L)	*	32.40 ± 2.96 (5)	24.20 ± 2.35 (5)		28.40 ± .510 (5)	29.40 ± 2.34 (5)
SGOT(IU/L)		68.20 ± 5.96 (5)	79.20 ± 4.62 (5)		83.80 ± 10.6 (5)	78.60 ± 6.59 (5)
BILI (MG Z)		.70 ± .039 (5)	.55 ± .089 (5)		.40 ± .074 (5)	.64 ± .033 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 82

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET	T R	.01 % IN DIET	T R	.10 % IN DIET	T R
ALBUMIN (GMZ)		4.60 ± .158 (5)	4.78 ± .116 (5)		4.94 ± .103 (5)		5.32 ± .095 (4)	*
ALK-P (IU/L)		99.00 ± 10.0 (5)	90.40 ± 17.4 (5)		91.40 ± 16.6 (5)		120.50 ± 21.2 (4)	
BUN (MG Z)		18.60 ± 1.57 (5)	16.00 ± .633 (5)		16.60 ± .510 (5)		19.25 ± 1.89 (4)	
CA (MG Z)	*	9.30 ± .100 (5)	9.40 ± .118 (5)		9.92 ± .447 (5)		11.02 ± .243 (4)	*
CHOL (MG Z)		34.00 ± 2.19 (5)	33.20 ± 3.14 (5)		33.00 ± 1.58 (5)		49.75 ± 3.82 (4)	* A
CREAT (MG Z)		.64 ± .024 (5)	.54 ± .024 (5)	* A	.50 ± 0.00 (5)	+ B	.52 ± .025 (4)	* A
GLUCOSE (MGZ)		126.00 ± 9.30 (5)	137.60 ± 8.06 (5)		126.80 ± 3.56 (5)		148.75 ± 4.21 (4)	
P (MG Z)		7.74 ± .417 (5)	8.50 ± .628 (5)		8.46 ± .556 (5)		11.70 ± .543 (4)	+ B
LDH (IU/L)		487.40 ± 74.4 (5)	688.40 ± 153. (5)		789.80 ± 178. (5)		863.50 ± 53.0 (4)	
TRIG (MG Z)	*	51.60 ± 6.22 (5)	70.80 ± 21.9 (5)		116.40 ± 50.1 (5)		89.50 ± 11.8 (4)	*
URIC ACID(MGZ)	*	2.92 ± .602 (5)	2.88 ± .925 (5)		2.08 ± .204 (5)		1.73 ± .160 (4)	
PROTEIN (MGZ)		6.06 ± .081 (5)	6.38 ± .124 (5)		6.38 ± .231 (5)		6.85 ± .132 (4)	*
SGPT (IU/L)	+	40.00 ± 9.92 (5)	71.40 ± 44.9 (5)		23.60 ± 1.94 (5)		27.75 ± 2.17 (4)	
SGOT(IU/L)	+	108.80 ± 25.8 (5)	114.60 ± 39.3 (5)		81.00 ± 5.11 (5)		79.75 ± 4.33 (4)	
BILI (MG Z)		.63 ± .036 (5)	.77 ± .046 (5)	B	.63 ± .028 (5)		.66 ± .013 (4)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 83

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T	R	T	R	T	R
ALBUMIN (MGZ)	*	5.74 ± .242 (5)	5.52 ± .477 (5)		5.84 ± .051 (5)		6.06 ± .129 (5)	
ALK-P (IU/L)	*	48.20 ± 3.72 (5)	82.00 ± 7.91 (5)	*	92.40 ± 26.7 (5)		56.80 ± 11.7 (5)	
BUN (MG Z)		20.00 ± 1.14 (5)	18.80 ± 1.02 (5)		19.40 ± .510 (5)		20.00 ± 1.38 (5)	
CA (MG Z)		11.40 ± .182 (5)	11.50 ± .421 (5)		12.14 ± .284 (5)		11.52 ± .689 (5)	
CHOL (MG Z)		59.80 ± 3.54 (5)	33.00 ± 9.07 (5)	* B	67.20 ± 4.77 (5)		46.80 ± 2.92 (5)	
CREAT (MG Z)		.68 ± .037 (5)	.66 ± .040 (5)		.68 ± .049 (5)		.64 ± .024 (5)	
GLUCOSE (MGZ)	*	118.00 ± 9.04 (5)	127.80 ± 15.2 (5)		121.20 ± 8.25 (5)		138.00 ± 2.81 (5)	
P (MG Z)		7.28 ± .685 (5)	7.58 ± .658 (5)		8.88 ± .498 (5)		10.52 ± .511 (5)	* A
LDH (IU/L)		774.20 ± 110. (5)	420.60 ± 102. (5)	A	647.20 ± 62.3 (5)		700.40 ± 89.6 (5)	
TRIG (MG Z)		63.80 ± 11.1 (5)	50.20 ± 3.89 (5)		48.60 ± 4.95 (5)		65.20 ± 4.85 (5)	
URIC ACID(MGZ)		1.82 ± .092 (5)	1.62 ± .318 (5)		1.98 ± .309 (5)		2.24 ± .402 (5)	
PROTEIN (MGZ)		6.98 ± .183 (5)	6.94 ± .271 (5)		7.04 ± .068 (5)		7.14 ± .144 (5)	
SGPT (IU/L)		24.20 ± 2.48 (5)	26.80 ± 2.91 (5)		28.60 ± 4.79 (5)		21.80 ± 1.69 (5)	
SGOT(IU/L)		82.00 ± 6.21 (5)	78.80 ± 9.96 (5)		84.60 ± 13.2 (5)		89.60 ± 13.3 (5)	
BILI (MG Z)		.64 ± .036 (5)	.60 ± .033 (5)		.69 ± .028 (5)		.64 ± .022 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

Table 84

MICROSCOPIC LESIONS IN MALE RATS AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet				
	0	.001%	.01%	.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Adrenals					
Large cysts in cortex	120				
Epididymis				176,177,178	
Atrophy				179,180	
Kidney					
Cortical tubular regeneration	118		160		
Interstitial lymphocytic foci	118	138,139	158,159,160	178	
Lung					
Chronic Respiratory Disease	116,117,118 119,120	136,137,138 139,140	156,157,158 159,160	176,177,178 179,180	
Focal alveolar collapse	120	138,139,140		176,180	
Focal alveolar collapse and dilation	116,119	136,137	156,157,158 159,160	178	
Spleen				176,177	
Hemosiderosis				179,180	
Testes					
Atrophy				177	
Atrophy and moderate focal interstitial				176,178	
cell hyperplasia				179,180	

MICROSCOPIC LESIONS IN MALE RATS AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

[illegible]

MICROSCOPIC LESIONS IN FEMALE RATS AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

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Table 86

MICROSCOPIC LESIONS IN MALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet			
	0	0.001%	0.01%	0.10%
	Group Designation			
	C0	C1	C2	C3
Animal Number				
Adrenals				
Congestion, mild to moderate focal	108			
Vacuolated cortical cells, slight focal		127		
Epididymis				
Aspermia		129		166,167,168 169,170
Kidney				
Hemorrhage, slight solitary	110			
Inflammation, acute, solitary	106			
Lymphocytic foci; cortical tubular regeneration			146	
Pigmentation, slight focal				167
Cortical tubular regeneration	109		150	
Liver				
Lymphocytic foci, slight			148,150	
Lung				
Alveolar collapse; chronic respiratory disease	106,109		146,148	166,167
Alveolar distension; chronic respiratory disease				
Alveolar collapse and distension; chronic respiratory disease	108	130		
Alveolar collapse and distension; chronic respiratory disease	110	126,127,128 129	147,149	168,169,170
Alveolar collapse and histiocytosis; chronic respiratory disease				
Chronic respiratory disease	107		150	

MICROSCOPIC LESIONS IN MALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

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MICROSCOPIC LESIONS IN FEMALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.10%	
	Group Designation				
	C0	C1	C2	C3	
Animal Number					
Adrenal					
Congestion, mild to moderate focal	208	230			
Kidney					
Lymphocytic foci	206		247		
Pigmentation, slight focal				270	
Liver					
Lymphocytic foci, slight	206	230			
Lung					
Alveolar collapse, focal; chronic respiratory disease			249, 250	270	
Alveolar distension, focal; chronic respiratory disease	207				
Alveolar collapse and distension; chronic respiratory disease	206, 208, 209, 210	226, 228, 230	246, 247, 248	266, 269	
Alveolar collapse, distension, histiocytosis; chronic respiratory disease				268	
Chronic respiratory disease		227, 229		267	
Lymph node					
Hemorrhage and congestion, moderate focal	206		250		
Ovary					
Cyst, solitary			249		
Pancreas					
Hemorrhage, slight focal			247		
Spleen					
Hemosiderosis (progressive severity, CO = C1 < C2 < C3)	206, 207, 208, 209, 210	226, 227, 228, 229, 230	246, 247, 248, 249, 250	266, 267, 268, 269, 270	

MICROSCOPIC LESIONS IN FEMALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

[illegible]

difference in severity was seen relative to controls. No other lesion occurred with a frequency and in a manner that implicated the treatment.

In rats allowed 4 weeks of recovery after 4 weeks of treatment (Tables 88 and 89), all 5 males at the highest dose level had slight interstitial cell hyperplasia in the testes and aspermia of the epididymis as well as hemosiderosis of the spleen. Females in all groups had hemosiderosis of the spleen, thus obscuring any dose relationship of the treatment. Chronic respiratory disease with various associated lesions was observed in the lungs of all rats in all groups at this sacrifice.

Microscopic lesions in tissues from rats allowed to recover for 4 weeks after 13 weeks of treatment are tabulated in Tables 90 and 91. Aspermia of the epididymis was seen in 3 males at the 0.10% condensate blend level, with clear indications of testicular atrophy in two of these cases, but in no other treatment groups. Hemosiderosis of the spleen was observed in all 5 males at this level; no more than one case was observed in any other group. In the females, hemosiderosis of the spleen was observed in the majority of rats in all groups, including controls; all five females at the 0.01 and 0.10% condensate blend levels were affected. None of the other lesions recorded appeared, on the basis of the frequency of incidence and distribution, to have any relationship to the treatment.

Discussion

No alterations from controls were detected in the rats fed 0.001% condensate water by weight in the diet for up to 90 days.

At the 0.01% treatment level, there is the suggestion of a suppressive effect of the treatment on body weight gain. This is based on the observed surge in weight gain for females during the first week of recovery after 4 weeks of treatment (Table 39). This increased weight gain appears to be dose-related and is accompanied by an increase (not statistically significant) in food consumption (Table 49). The livers in male and female groups treated at this 0.01% level were apparently enlarged at the 4-week sacrifice relative to controls, as reflected in the higher liver-to-body weight (statistically significant) and liver-to-brain weight ratios; this may also be an effect of the treatment. Females at this level also had enlarged spleens at 4 weeks and hemosiderosis of the spleen at 13 weeks that appeared, based on the dose response of each effect, to be treatment-related. Both sexes had very slight reticulocytosis in the early stages of the treatment and males exhibited elevated triglyceride levels after 13 weeks. All of these effects were either absent or no longer significant in recovery rats, indicating that reversal of toxic symptoms occurs in rats treated for up to 13 weeks with 0.01% condensate water in the diet.

Table 88

MICROSCOPIC LESIONS IN MALE RATS AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet			
	0	0.001%	0.01%	0.10%
	Group Designation			
	Animal Number			
Adrenal				
Marked vacuolation of cortical cells		133		
Bone Marrow				
Prominently dilated sinusoids	112	133	153	
Epididymis				
Aspermia				171, 172, 173 174, 175
Kidney				
Nephrosis, slight to moderate focal;		135		
Hydronephrosis, moderate; occasional				
lymphocytic foci in cortex; solitary				
focus of tubular regeneration	112			
Occasional lymphocytic foci in cortex			155	
Liver				
Occasional portal lymphocytic foci			153, 155	
Moderate chronic hepatitis				173
Lungs				
Focal alveolar collapse (moderate); chronic				
respiratory disease	113, 114	131, 132, 133	151, 152, 153	173, 175
		135		
Focal alveolar collapse; distension;				
chronic respiratory disease	111, 112, 115		154, 155	171, 174
Chronic respiratory disease		134		172
Pituitary				
Occasional cysts		134		
Spleen				
Hemosiderosis				171, 172, 173 174, 175



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MICROSCOPIC LESIONS IN FEMALE RATS AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT AND 4 WEEKS OF RECOVERY

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Table 90

MICROSCOPIC LESIONS IN MALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Adrenal					
Vacuolated cortical cells	103, 104	121, 123			
Brain					
Hemorrhage, slight			145		
Epididymis					
Aspermia				161, 164, 165	
Kidney					
Cortical tubular regeneration	103				
Lymphocytic foci	105	125		161	
Cortical tubular regeneration and lymphocytic foci	104	121, 122	144		
Cortical tubular regeneration; slight cell debris in cortex tubules; lymphocytic foci			143		
Liver					
Lymphocytic foci, slight to moderate	102, 105	122, 125	141, 144		
Leukocytic foci, slight				161	
Fatty change, one focus, slight				165	
Lung					
Alveolar collapse, slight focal; chronic respiratory disease			144		
Alveolar distension; hemorrhage; chronic respiratory disease	102				
Alveolar distension and collapse, slight to moderate focal; chronic respiratory disease					
	104, 105	121, 124, 125	141, 143	161, 162	
Alveolar distension and collapse; hemorrhage; chronic respiratory disease			145		

MICROSCOPIC LESIONS IN MALE RATS AFTER 13 WEEKS OF
CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

[illegible]

Table 91

MICROSCOPIC LESIONS IN FEMALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet			
	0	0.001%	0.01%	0.10%
	Group Designation			
	C0	C1	C2	C3
Animal Number				
Brain				
Gliosis, slight	204			
Kidney				
Lymphocytic foci	201			
Lymphocytic foci and cortical tubular regeneration				265
Liver				
Lymphocytic foci, slight to moderate	204, 205	223, 225	241, 242, 244 245	264, 265
Lung				
Alveolar collapse and chronic respiratory disease			243	
Alveolar distension and chronic respiratory disease	202			
Alveolar histiocytosis and chronic respiratory disease		223		265
Alveolar collapse and distension; chronic respiratory disease	201, 203, 205	222, 225	242	261, 262, 263 264
Alveolar collapse and histiocytosis; abscess; chronic respiratory disease	204			
Chronic respiratory disease		221, 224	241, 244, 245	
Spinal cord				
Granuloma, slight solitary				261
Spleen				
Hemosiderosis, focal, usually slight, sometimes moderate	203, 204, 205	221, 223, 224 225	241, 242, 243 244, 245	261, 262, 263 264, 265

MICROSCOPIC LESIONS IN FEMALE RATS AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT AND 4 WEEKS OF RECOVERY

[illegible]

Rats treated at the 0.10% condensate water level exhibited numerous toxic symptoms: suppressed body weight, weight gain, and food intake; rough fur; a compensatory anemia; extremely pronounced reticulocytosis accompanied by polychromatic erythrocytes, moderate hypochromia, nucleated red blood cells and Heinz bodies; enlarged spleens with associated hemosiderosis; testicular atrophy with atrophy and aspermia of the epididymi and moderate focal interstitial cell hyperplasia in a number of these cases; hyperplasia of the uterus; and elevated triglyceride levels. Other differences that may be treatment-related were the elevation in serum Ca^{2+} and phosphorus and in uric acid after 4 weeks of treatment. Although extrarenal causes cannot be discounted, the lower relative kidney-to-brain weight ratios in the rats after 4 weeks of treatment at the 0.10% dose level (Tables 60 and 61) are possibly related to these differences. Microscopic examination of kidney tissues from these rats failed to disclose confirmatory evidence of renal dysfunction, however.

Food efficiency--food consumption/ Δ body weight--was lower for males and females at the high dose level throughout most of the treatment period compared with controls. Liver-to-body weight and liver-to-brain weight ratio increases noted in some of these treated groups at sacrifice might indicate increased metabolic activity in these animals (see the following section on mice), but the increases are marginal and sometimes inconsistent--e.g., the decreased liver-to-brain weight ratio for 4-week males compared with other treatment groups (Tables 60 and 64).

Recovery groups continued to exhibit some alterations, particularly those that were treated for 13 weeks with the 0.10% condensate water diet. These rats did not increase their body weights to the control level within the 4-week recovery period. Testes weights for the males remained significantly low and slight interstitial cell hyperplasia and aspermia of the epididymi, as well as hemosiderosis of the spleen, were observed at each sacrifice. Although anemia was not present, signs of the compensatory mechanism were, as suggested by the tendency toward high hemoglobin, hematocrit, and MCV at this level. It is unclear as to whether triglyceride levels had returned to normal 4 weeks after discontinuation of the treatment. It is clear that serum phosphorus remained elevated. Since Ca^{2+} was not correspondingly altered, the elevation in phosphorus is possibly associated with the accelerated growth of the rats.

The toxicity of 2,4-DNT and 2,6-DNT, the major components in condensate water mixture, has been documented in Sprague-Dawley rats exposed to these chemicals in their diets for up to 13 weeks.^{39,40} Depression of weight gain, hemosiderosis of the spleen, mild compensatory anemia, testicular atrophy with aspermatogenesis, and at the high (0.7%) dose neuromuscular effects (widespread and stiff hind legs, with gliosis and/or demyelination in two cases) and unscheduled deaths were observed for 2,4-DNT. Depression of body weight gain and food intake, elevated SGPT, extramedullary hematopoiesis (spleen and

liver), bile duct hyperplasia, aspermia and testicular atrophy, and at the high (0.25%) dose a compensatory pronounced reticulocytosis and methemoglobin-induced anemia were found in rats treated with 2,6-DNT. Thus, except for the neurological effects with 2,4-DNT and the change in SGPT (noted, however, in only two animals), extra-medullary hematopoiesis, and bile duct hyperplasia with 2,6-DNT-treated rats, all effects which were either marginal or not observed at the dose level (0.01%) comparable to that of the 2,6-DNT content of the mixture, these same observations were made on treated rats in the present study. The elevation in triglycerides, which were not measured in the earlier works, change in food efficiency, enlargement of the spleens, and uterine hyperplasia are additional findings in this study of the condensate water mixture.

STUDIES IN MICE

Procedures

Eighty male and 80 female Swiss-Webster mice from Simonsen Laboratories were used. The protocol and test methods for this experiment and the dose levels were the same as those for rats, with the following differences:

- (1) Mice were housed five to a cage.
- (2) Feeders in the cages were of the covered variety.
- (3) Individual mice were identified with cage cards and by ear punch (both ears).
- (4) No blood chemistry was done because of the small amount of blood available from a mouse.

The methods of drawing blood for hematology, of euthanization, and of storage and transfer of blood samples to the SRI Clinical Chemistry Laboratory were the same as for rats. Weekly body weights and food consumption were determined in the same manner as for rats. The organs and tissues examined grossly and microscopically were the same for the mouse as for the rat except for the addition of the cholecyst in the mice.

Results

Observations

Throughout the study males in all groups had rough fur. Several had scabs on their bodies and chewed backs, posteriors, tails, or penises. On several occasions males were seen to be fighting with each other. Fighting was undoubtedly responsible for the foregoing observations.

As the study progressed, several males at the high-dose level developed toxic symptoms, including ataxia, humped backs, abnormal postures (head was tilted to the right), and circling in the cage. Several males were anemic in appearance; one was very thin and inactive, and had a humped back. One recovery male was slightly cyanotic during the last week of treatment, from which condition it apparently recovered when the treatment was discontinued.

No unusual signs were seen in female mice except in the high-dose group. In that group, rough fur and humped backs were observed in two animals during Weeks 2 through 4. During Week 4, one of the two appeared anemic and ataxic; its condition worsened rapidly during the next week, and it died on Day 30. The other mouse recovered. Two other females were observed to be ataxic on separate occasions. Most of the high-dose females appeared anemic, beginning in Week 9 and lasting until the treatment ended.

Body Weights

Mean body weights of mice treated with condensate blend for 13 weeks are presented in Tables 92 and 93. Mice at the 0.10% level tended to weigh less than control mice during the treatment, significantly so at some weighings. The loss in body weights of males at the high dose during Weeks 6 through 8 is due to animals that were deteriorating and that died prematurely.

Mean body weights of treated mice allowed a 4-week recovery period are given in Tables 94 through 97. Among mice treated for 4 weeks with an additional 4 weeks of recovery (Tables 94 and 95), the only statistically significant differences were the higher weights of the 0.001% female treatment group in Weeks 6 through 8. Since no comparable increase in weight (relative to controls) was seen in the male 0.001% group, it appears that these significant differences were probably related to the decrease in the extent of weight gain in the female controls rather than to a treatment effect. The absence of a linear trend in the data (Table D-9) supports this statement. The same observations apply to males at the 0.01% treatment level set aside for recovery. Males at the high dose that underwent 4 weeks of treatment and 4 weeks of recovery had a higher initial mean body weight (though not significantly so) than did other groups. These high-dose males failed to increase their weight at the normal rate during Week 1 because one of them lost weight progressively during that week; this male died on Day 8 of the study.

Mice allowed 4 weeks of recovery after 13 weeks of treatment at the 0.10% level increased their weight substantially from Week 14 to Week 17 relative to control and other groups (Tables 96 and 97). The body weights of these mice still lagged behind those of controls at sacrifice.

Weekly body weight differences for the mice appear in Tables 98 through 103. Most notable is the low body weight gain during Week 1 for males at the high dose and for females at the highest two doses relative to other groups (Tables 98 and 99) and the increased weight gain of mice in these groups during the first week of recovery after 4 weeks of treatment (Tables 100 and 101). None of these changes were statistically significant. An immediate increase in body weight gain

TABLE 92

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
INITIAL		25.15 ± .539 (20)	25.75 ± .672 (20)		25.35 ± .815 (20)	25.35 ± .779 (20)
WEEK 1	*	28.25 ± .480 (20)	28.20 ± .506 (20)		28.10 ± .688 (20)	26.75 ± .852 (20)
WEEK 2	*	29.75 ± .502 (20)	29.95 ± .540 (20)		28.05 ± .705 (20)	28.05 ± .984 (19)
WEEK 3	*	30.70 ± .590 (20)	31.55 ± .613 (20)		30.75 ± .900 (20)	28.11 ± 1.15 (19)
WEEK 4	*	31.25 ± .668 (20)	32.35 ± .595 (20)		30.90 ± .900 (20)	27.79 ± 1.36 (19) *
WEEK 5		32.27 ± .933 (15)	31.10 ± 1.26 (10)		32.30 ± .790 (10)	29.00 ± 1.31 (10)
WEEK 6		32.47 ± .945 (15)	32.80 ± 1.11 (10)		34.20 ± .800 (10)	28.30 ± 1.15 (10) *
WEEK 7		32.60 ± 1.23 (15)	32.10 ± 1.25 (10)		32.30 ± 1.12 (10)	27.10 ± 1.51 (10) *
WEEK 8		35.67 ± .911 (15)	33.60 ± .777 (10)		35.90 ± 1.09 (10)	27.00 ± 1.91 (9) + A
WEEK 9		35.20 ± 1.23 (10)	35.20 ± 1.03 (10)		35.50 ± 1.00 (10)	30.00 ± 1.86 (7)
WEEK 10		35.30 ± 1.31 (10)	33.90 ± 1.28 (10)		36.30 ± .989 (10)	30.86 ± 1.45 (7)
WEEK 11		35.10 ± 1.36 (10)	33.40 ± .884 (10)		33.20 ± 1.06 (10)	30.57 ± 1.59 (7)
WEEK 12		37.70 ± 1.27 (10)	36.00 ± .894 (10)		33.90 ± 1.28 (10)	31.71 ± 1.86 (7) *
WEEK 13		36.20 ± 1.30 (10)	35.50 ± .934 (10)		34.90 ± 1.06 (10)	31.86 ± 1.87 (7)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 93

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 Z IN DIET	T R	.01 Z IN DIET	T R	.10 Z IN DIET	T R
INITIAL		23.35 ± .418 (20)	22.90 ± .538 (20)		22.75 ± .542 (20)		22.55 ± .545 (20)	
WEEK 1		25.80 ± .433 (20)	25.40 ± .419 (20)		24.10 ± .589 (20)		24.30 ± .616 (20)	
WEEK 2		26.50 ± .444 (20)	26.50 ± .500 (20)		24.50 ± .639 (20)		25.05 ± .705 (20)	
WEEK 3	*	27.65 ± .443 (20)	27.50 ± .596 (20)		26.10 ± .692 (20)		25.40 ± .869 (20)	*
WEEK 4		28.65 ± .586 (20)	29.10 ± .598 (20)		26.75 ± .672 (20)		25.65 ± .930 (20)	*
WEEK 5		28.73 ± .665 (15)	28.90 ± .900 (10)		29.00 ± 1.34 (10)		26.78 ± .997 (9)	
WEEK 6		29.80 ± .509 (15)	29.60 ± .884 (10)		28.30 ± .844 (10)		25.67 ± 1.15 (9)	+
WEEK 7		29.73 ± .556 (15)	29.50 ± .703 (10)		28.70 ± .716 (10)		26.11 ± 1.20 (9)	*
WEEK 8		30.47 ± .624 (15)	31.00 ± .869 (10)		29.90 ± .823 (10)		25.89 ± 1.33 (9)	+
WEEK 9		31.40 ± .636 (10)	31.20 ± .952 (10)		30.40 ± .636 (10)		26.33 ± 1.37 (9)	+
WEEK 10		30.90 ± .547 (10)	31.50 ± .563 (10)		31.40 ± .897 (10)		27.11 ± 1.18 (9)	*
WEEK 11	*	29.50 ± .601 (10)	31.10 ± .586 (10)		30.20 ± .416 (10)		27.56 ± 1.18 (9)	
WEEK 12		30.60 ± .702 (10)	32.00 ± .907 (10)		32.20 ± .490 (10)		28.67 ± 1.31 (9)	
WEEK 13		31.10 ± .547 (10)	31.90 ± .752 (10)		31.60 ± .686 (10)		28.89 ± 1.24 (9)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 94
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET	T R	.01 % IN DIET	T R	.10 % IN DIET	T R
INITIAL		25.15 ± .539 (20)	26.40 ± 1.36 (5)		26.80 ± 1.11 (5)		28.20 ± .800 (5)	
WEEK 1		28.25 ± .480 (20)	28.00 ± 1.18 (5)		30.00 ± .894 (5)		29.00 ± 1.82 (5)	
WEEK 2		29.75 ± .502 (20)	29.40 ± 1.21 (5)		30.00 ± .837 (5)		32.25 ± 1.38 (4)	
WEEK 3		30.70 ± .590 (20)	31.80 ± 1.39 (5)		34.00 ± 1.10 (5)		31.75 ± 1.89 (4)	
WEEK 4		31.25 ± .668 (20)	32.60 ± 1.12 (5)		34.60 ± 1.17 (5)		32.00 ± 2.42 (4)	
WEEK 5		32.27 ± .933 (15)	34.40 ± .980 (5)		36.80 ± 1.07 (5)		35.25 ± 1.75 (4)	
WEEK 6		32.47 ± .945 (15)	33.80 ± 1.11 (5)		39.00 ± .837 (5)	+	36.25 ± 1.49 (4)	
WEEK 7		32.60 ± 1.23 (15)	34.80 ± .860 (5)		38.20 ± .800 (5)		37.00 ± 1.58 (4)	
WEEK 8		35.67 ± .914 (15)	35.60 ± 1.08 (5)		40.00 ± .775 (5)		38.00 ± 1.47 (4)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 95
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 Z IN DIET	T R	.01 Z IN DIET	T R	.10 Z IN DIET	T R
INITIAL		23.35 ± .418 (20)	22.80 ± 1.53 (5)		23.40 ± 1.44 (5)		24.00 ± .894 (5)	
WEEK 1		25.80 ± .433 (20)	26.60 ± 1.08 (5)		24.20 ± 1.16 (5)		24.80 ± .800 (5)	
WEEK 2		26.50 ± .444 (20)	27.20 ± 1.16 (5)		24.60 ± .927 (5)		26.00 ± .894 (5)	
WEEK 3		27.65 ± .443 (20)	29.60 ± .927 (5)		25.60 ± 1.40 (5)		27.00 ± .707 (5)	
WEEK 4		28.65 ± .586 (20)	31.00 ± 1.05 (5)		27.40 ± 1.25 (5)		27.20 ± 1.02 (5)	
WEEK 5		28.73 ± .665 (15)	32.20 ± 1.02 (5)		29.40 ± 1.12 (5)		29.40 ± .748 (5)	
WEEK 6		29.80 ± .509 (15)	33.60 ± 1.12 (5)	*	30.60 ± 1.36 (5)		31.20 ± .970 (5)	
WEEK 7		29.73 ± .556 (15)	34.00 ± 1.45 (5)	*	31.20 ± 1.59 (5)		30.40 ± 1.17 (5)	
WEEK 8		30.47 ± .624 (15)	34.60 ± 1.17 (5)	*	30.60 ± 1.44 (5)		32.00 ± .633 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 96

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
INITIAL		25.15 ± .539 (20)	23.60 ± 1.17 (5)		23.40 ± 1.44 (5)	25.20 ± 1.80 (5)
WEEK 1		28.25 ± .480 (20)	27.20 ± .735 (5)		27.60 ± 1.21 (5)	26.80 ± 1.59 (5)
WEEK 2		29.75 ± .502 (20)	28.80 ± .860 (5)		26.60 ± 1.36 (5)	28.40 ± 1.50 (5)
WEEK 3		30.70 ± .590 (20)	29.20 ± 1.32 (5)		29.00 ± 1.73 (5)	28.80 ± 2.18 (5)
WEEK 4		31.25 ± .668 (20)	30.40 ± 1.63 (5)		29.00 ± 1.64 (5)	28.00 ± 2.10 (5)
WEEK 5		32.27 ± .933 (15)	28.60 ± 1.72 (5)		31.40 ± 1.50 (5)	28.60 ± 1.63 (5)
WEEK 6		32.47 ± .945 (15)	31.40 ± 1.86 (5)		33.20 ± 1.39 (5)	28.00 ± 1.18 (5)
WEEK 7		32.60 ± 1.23 (15)	29.80 ± 1.77 (5)		31.80 ± 1.59 (5)	25.40 ± 1.86 (5) *
WEEK 8		35.67 ± .914 (15)	33.60 ± 1.44 (5)		34.80 ± 2.08 (5)	25.25 ± 3.35 (4) + A
WEEK 9		35.20 ± 1.23 (10)	34.00 ± 1.67 (5)		35.60 ± 1.94 (5)	31.00 ± 1.00 (2)
WEEK 10		35.30 ± 1.31 (10)	31.60 ± 1.94 (5)		35.80 ± 1.85 (5)	32.00 ± 1.00 (2)
WEEK 11		35.10 ± 1.36 (10)	32.60 ± 1.63 (5)		33.60 ± 1.91 (5)	32.00 ± 1.00 (2)
WEEK 12		37.70 ± 1.27 (10)	35.40 ± 1.72 (5)		35.40 ± 2.20 (5)	34.00 ± 0.00 (2)
WEEK 13		36.20 ± 1.30 (10)	34.00 ± 1.45 (5)		34.80 ± 1.93 (5)	33.00 ± 0.00 (2)
WEEK 14		40.00 ± 1.38 (5)	38.60 ± 1.83 (5)		40.60 ± 1.96 (5)	32.50 ± .500 (2)
WEEK 15		40.80 ± 1.59 (5)	40.20 ± 1.88 (5)		40.80 ± 2.08 (5)	34.50 ± .500 (2)
WEEK 16		39.60 ± 1.29 (5)	39.80 ± 1.85 (5)		36.40 ± 2.23 (5)	35.50 ± .500 (2)
WEEK 17		39.60 ± 1.12 (5)	38.20 ± 1.77 (5)		38.40 ± 2.01 (5)	36.50 ± .500 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 97

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 Z		.01 Z		.10 Z	
			IN DIET	T R	IN DIET	T R	IN DIET	T R
INITIAL		23.35 ± .418 (20)	22.00 ± 1.00 (5)		22.80 ± 1.02 (5)		21.60 ± .678 (5)	
WEEK 1		25.80 ± .433 (20)	25.40 ± .872 (5)		25.00 ± 1.10 (5)		23.00 ± 1.14 (5)	
WEEK 2		26.50 ± .444 (20)	27.20 ± .860 (5)		25.20 ± .916 (5)		24.20 ± 1.11 (5)	
WEEK 3		27.65 ± .443 (20)	28.40 ± 1.03 (5)		27.00 ± .949 (5)		24.20 ± 1.46 (5)	*
WEEK 4		28.65 ± .586 (20)	28.80 ± 1.02 (5)		27.20 ± .800 (5)		24.40 ± 1.47 (5)	*
WEEK 5		28.73 ± .665 (15)	30.20 ± 1.07 (5)		32.00 ± 1.82 (5)		25.80 ± 1.66 (5)	
WEEK 6		29.80 ± .509 (15)	30.80 ± 1.16 (5)		30.40 ± .812 (5)		25.00 ± 1.87 (5)	*
WEEK 7		29.73 ± .556 (15)	30.40 ± .748 (5)		29.60 ± 1.17 (5)		25.40 ± 1.83 (5)	*
WEEK 8		30.47 ± .624 (15)	32.60 ± 1.03 (5)		31.20 ± 1.32 (5)		25.20 ± 1.98 (5)	*
WEEK 9		31.40 ± .636 (10)	33.20 ± 1.07 (5)		31.40 ± .927 (5)		26.00 ± 2.02 (5)	*
WEEK 10		30.90 ± .547 (10)	32.60 ± .600 (5)		33.00 ± 1.38 (5)		26.80 ± 1.71 (5)	
WEEK 11		29.50 ± .601 (10)	31.80 ± .860 (5)		30.60 ± .678 (5)		27.40 ± 1.75 (5)	
WEEK 12		30.60 ± .702 (10)	33.60 ± 1.03 (5)		32.60 ± .927 (5)		28.00 ± 2.07 (5)	
WEEK 13		31.10 ± .547 (10)	33.00 ± .949 (5)		32.40 ± 1.21 (5)		27.80 ± 1.98 (5)	
WEEK 14		32.80 ± 1.07 (5)	34.60 ± 1.08 (5)		33.40 ± 1.21 (5)		29.40 ± 1.81 (5)	
WEEK 15		34.40 ± 1.17 (5)	37.00 ± .707 (5)		34.40 ± 1.63 (5)		31.80 ± 1.96 (5)	
WEEK 16		33.60 ± 1.17 (5)	35.40 ± .927 (5)		34.00 ± 1.30 (5)		31.40 ± 1.96 (5)	
WEEK 17		34.40 ± 1.12 (5)	35.20 ± .800 (5)		31.40 ± .748 (5)		32.20 ± 2.27 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A.

20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 98

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
WEEK 1		3.10 ± .339 (20)	2.45 ± .426 (20)		2.75 ± .547 (20)		1.40 ± .387 (20)	B
WEEK 2		1.50 ± .267 (20)	1.75 ± .260 (20)		-.05 ± .438 (20)	* D	1.11 ± .374 (19)	
WEEK 3		.95 ± .285 (20)	1.60 ± .255 (20)		2.70 ± .378 (20)	+	.05 ± .363 (19)	B
WEEK 4	*	.55 ± .198 (20)	.80 ± .200 (20)		.15 ± .221 (20)		-.32 ± .412 (19)	
WEEK 5		1.40 ± .335 (15)	-.40 ± .562 (10)	D	1.50 ± .401 (10)		.50 ± .601 (10)	
WEEK 6		.20 ± .355 (15)	1.70 ± .448 (10)	x	1.90 ± .482 (10)	x	-.70 ± .597 (10)	x
WEEK 7	*	.13 ± .867 (15)	-.70 ± .367 (10)	x	-1.90 ± .737 (10)	x	-1.20 ± .742 (10)	x
WEEK 8		3.07 ± .679 (15)	1.50 ± .847 (10)		3.60 ± .686 (10)		-.78 ± .760 (9)	+ D
WEEK 9		0.00 ± .471 (10)	1.60 ± .452 (10)	x	-.40 ± .476 (10)	x	.86 ± .459 (7)	x
WEEK 10		.10 ± .315 (10)	-1.30 ± .517 (10)	x	.80 ± .442 (10)	x	.86 ± .459 (7)	x
WEEK 11	*	-.20 ± .249 (10)	-.50 ± .601 (10)	x	-3.10 ± .407 (10)	+	-.29 ± .286 (7)	x
WEEK 12	*	2.60 ± .371 (10)	2.60 ± .163 (10)		.70 ± .473 (10)	* B	1.14 ± .508 (7)	*
WEEK 13		-1.50 ± .307 (10)	-.50 ± .428 (10)	x	1.00 ± .596 (10)	+	.14 ± .404 (7)	x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

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+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 99

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET	T R	IN DIET	T R	IN DIET	T R
WEEK 1		2.45 ± .336 (20)	2.50 ± .426 (20)		1.35 ± .386 (20)	A	1.75 ± .270 (20)	
WEEK 2	*	.70 ± .193 (20)	1.10 ± .332 (20)		.40 ± .343 (20)		.75 ± .422 (20)	
WEEK 3		1.15 ± .182 (20)	1.00 ± .308 (20)		1.60 ± .311 (20)		.35 ± .319 (20)	A
WEEK 4		1.00 ± .299 (20)	1.60 ± .319 (20)		.65 ± .365 (20)		.25 ± .347 (20)	
WEEK 5	+	.73 ± .530 (15)	1.10 ± .179 (10)	x	3.10 ± 1.25 (10)	x	1.44 ± .294 (9)	x
WEEK 6	+	1.07 ± .547 (15)	.70 ± .153 (10)	x	-.70 ± 1.16 (10)	x	-1.11 ± .351 (9)	* x
WEEK 7		-.07 ± .284 (15)	-.10 ± .407 (10)	x	.40 ± .452 (10)	x	.44 ± .176 (9)	x
WEEK 8		.73 ± .371 (15)	1.50 ± .453 (10)		1.20 ± .327 (10)		-.22 ± .278 (9)	A
WEEK 9		1.40 ± .340 (10)	.20 ± .291 (10)	C	.50 ± .373 (10)	A	.44 ± .242 (9)	A
WEEK 10		-.50 ± .269 (10)	.30 ± .423 (10)	x	1.00 ± .447 (10)		.78 ± .401 (9)	
WEEK 11		-1.40 ± .267 (10)	-.40 ± .306 (10)	x	-1.20 ± .573 (10)	x	.44 ± .294 (9)	* x
WEEK 12		1.10 ± .407 (10)	.90 ± .482 (10)		2.00 ± .258 (10)		1.11 ± .309 (9)	
WEEK 13	*	.50 ± .601 (10)	-.10 ± .277 (10)	x	-.60 ± .267 (10)	x	.22 ± .401 (9)	x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 100
EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
WEEK 1		3.10 ± .339 (20)	1.60 ± .678 (5)		3.20 ± .970 (5)	.80 ± 1.07 (5)
WEEK 2	*	1.50 ± .267 (20)	1.40 ± .600 (5)		0.00 ± 1.48 (5)	1.75 ± .250 (4)
WEEK 3	*	.95 ± .285 (20)	2.40 ± .245 (5)	+	4.00 ± 1.14 (5)	-.50 ± .957 (4)
WEEK 4		.55 ± .198 (20)	.80 ± .374 (5)		.60 ± .400 (5)	.25 ± .750 (4)
WEEK 5		1.40 ± .335 (15)	1.80 ± .490 (5)		2.20 ± .374 (5)	3.25 ± 1.25 (4)
WEEK 6		.20 ± .355 (15)	-.60 ± .400 (5)	x	2.20 ± .374 (5)	1.00 ± .408 (4)
WEEK 7	+	.13 ± .867 (15)	1.00 ± .316 (5)	x	-.80 ± .374 (5)	.75 ± .250 (4)
WEEK 8	*	3.07 ± .679 (15)	.80 ± .583 (5)	* B	1.80 ± .200 (5)	1.00 ± .817 (4)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 101
EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET	T R	.01 % IN DIET	T R	.10 % IN DIET	T R
WEEK 1		2.45 ± .336 (20)	3.80 ± .663 (5)		.80 ± 1.02 (5)		.80 ± .200 (5)	
WEEK 2	*	.70 ± .193 (20)	.60 ± .400 (5)		.40 ± 1.03 (5)		1.20 ± .800 (5)	
WEEK 3		1.15 ± .182 (20)	2.40 ± .400 (5)		1.00 ± .837 (5)		1.00 ± .447 (5)	
WEEK 4		1.00 ± .299 (20)	1.40 ± .510 (5)		1.80 ± .800 (5)		.20 ± .583 (5)	
WEEK 5		.73 ± .530 (15)	1.20 ± .374 (5)	x	2.00 ± .316 (5)	x	2.20 ± .800 (5)	x
WEEK 6	*	1.07 ± .547 (15)	1.40 ± .245 (5)	x	1.20 ± .374 (5)	x	1.80 ± .583 (5)	x
WEEK 7		-.07 ± .284 (15)	.40 ± .400 (5)	x	.60 ± .510 (5)	x	-.80 ± .663 (5)	x
WEEK 8		.73 ± .371 (15)	.60 ± .510 (5)	x	-.60 ± .748 (5)	x	1.60 ± .678 (5)	x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x .

TABLE 102
EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF MALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
WEEK 1		3.10 ± .339 (20)	3.60 ± 1.21 (5)		4.20 ± .583 (5)	1.60 ± .400 (5)
WEEK 2		1.50 ± .267 (20)	1.60 ± .678 (5)		-1.00 ± .633 (5)	* D 1.60 ± .980 (5)
WEEK 3		.95 ± .285 (20)	.40 ± .510 (5)		2.40 ± .678 (5)	.40 ± .812 (5)
WEEK 4		.55 ± .198 (20)	1.20 ± .374 (5)		0.00 ± .316 (5)	- .80 ± .916 (5)
WEEK 5		1.40 ± .335 (15)	-1.80 ± .490 (5)	+ D	2.40 ± .245 (5)	.60 ± .678 (5)
WEEK 6		.20 ± .355 (15)	2.80 ± .374 (5)	* x	1.80 ± .860 (5)	x - .60 ± 1.21 (5)
WEEK 7	*	.13 ± .867 (15)	-1.60 ± .245 (5)	x	-1.40 ± .510 (5)	x -2.60 ± 1.08 (5)
WEEK 8		3.07 ± .679 (15)	3.80 ± .663 (5)		3.00 ± .548 (5)	-1.25 ± 1.80 (4) * D
WEEK 9		0.00 ± .471 (10)	.40 ± .245 (5)	x	.80 ± .374 (5)	x 0.00 ± 0.00 (2)
WEEK 10		.10 ± .315 (10)	-2.40 ± .510 (5)	+ x	.20 ± .663 (5)	x 1.00 ± 0.00 (2)
WEEK 11		-.20 ± .249 (10)	1.00 ± .447 (5)		-2.20 ± .374 (5)	+ 0.00 ± 0.00 (2)
WEEK 12		2.60 ± .371 (10)	2.80 ± .200 (5)		1.80 ± .583 (5)	2.00 ± 1.00 (2)
WEEK 13		-1.50 ± .307 (10)	-1.40 ± .600 (5)	x	-.60 ± .510 (5)	x -1.00 ± 0.00 (2)
WEEK 14		2.60 ± .245 (5)	4.60 ± .400 (5)	+ B	5.80 ± .200 (5)	+ D -.50 ± .500 (2)
WEEK 15		.80 ± .374 (5)	1.60 ± .400 (5)	x	.20 ± .374 (5)	x 2.00 ± 1.00 (2)
WEEK 16		-1.20 ± .374 (5)	-.40 ± .245 (5)	x	-.40 ± .245 (5)	+ x 1.00 ± 0.00 (2)
WEEK 17		0.00 ± .447 (5)	-1.60 ± .510 (5)	x	2.00 ± .316 (5)	* x 1.00 ± 0.00 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 103

EFFECTS OF CONDENSATE WATER ON DIFFERENCES IN BODY WEIGHTS (G)
OF FEMALE NICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
WEEK 1		2.45 ± .336 (20)	3.40 ± .678 (5)		2.20 ± .490 (5)	1.40 ± .600 (5)
WEEK 2		.70 ± .193 (20)	1.80 ± .374 (5)		.20 ± .200 (5)	1.20 ± .200 (5)
WEEK 3		1.15 ± .182 (20)	1.20 ± .200 (5)		1.80 ± .490 (5)	0.00 ± .447 (5)
WEEK 4	*	1.00 ± .299 (20)	.40 ± .245 (5)		.20 ± .200 (5)	.20 ± .860 (5)
WEEK 5	+	.73 ± .530 (15)	1.40 ± .245 (5)	x	4.80 ± 2.31 (5)	1.40 ± .245 (5)
WEEK 6	+	1.07 ± .547 (15)	.60 ± .245 (5)	x	-1.60 ± 2.38 (5)	-.80 ± .374 (5)
WEEK 7		-.07 ± .284 (15)	-.40 ± .678 (5)	x	-.80 ± .374 (5)	.40 ± .245 (5)
WEEK 8		.73 ± .371 (15)	2.20 ± .583 (5)		1.60 ± .510 (5)	-.20 ± .200 (5)
WEEK 9		1.40 ± .340 (10)	.60 ± .400 (5)		.20 ± .735 (5)	.80 ± .200 (5)
WEEK 10		-.50 ± .269 (10)	-.60 ± .510 (5)	x	1.60 ± .812 (5)	.80 ± .583 (5)
WEEK 11		-1.40 ± .267 (10)	-.80 ± .374 (5)	x	-2.40 ± .748 (5)	.60 ± .245 (5)
WEEK 12		1.10 ± .407 (10)	1.80 ± .374 (5)		2.00 ± .447 (5)	.60 ± .400 (5)
WEEK 13		.50 ± .601 (10)	-.60 ± .245 (5)	x	-.20 ± .374 (5)	-.20 ± .490 (5)
WEEK 14		1.40 ± .510 (5)	1.60 ± .812 (5)		1.00 ± 0.00 (5)	1.60 ± .600 (5)
WEEK 15		1.60 ± .245 (5)	2.40 ± .510 (5)		1.00 ± .548 (5)	2.40 ± .245 (5)
WEEK 16		-.80 ± .200 (5)	-1.60 ± .400 (5)	x	-.40 ± .510 (5)	-.40 ± .400 (5)
WEEK 17	*	.80 ± .200 (5)	-.20 ± .374 (5)		-2.60 ± 1.29 (5)	.80 ± .490 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x

upon discontinuation of the treatment was not observed in mice exposed to condensate blend for 13 weeks; in fact, the males at the high dose showed a loss ($p < 0.01$) on the first week of recovery. Over the full 4 weeks of recovery, however, both males and females added weight about 50% faster than controls, a clear sign of recovery from treatment. The significant increases in body weight gain for males at the 0.001 and 0.01% condensate blend levels during Week 14 (Tables 102 and 103) was not sustained over the recovery period--the sum of the body weight gains for Weeks 14 and 17 were almost the same for control and these treatment groups--and consequently increases are probably not due to discontinuation of the treatment per se.

Food Consumption

Food consumption data were computed weekly and appear in Tables 104 through 109. Food intake for males and females at the high dose is appreciably lower than for controls, beginning in Week 3 and lasting throughout treatment (Tables 104 and 105). This observation correlates well with the period during which significant depression in body weight is observed among these animals (Tables 92 and 93). However, during the first week of treatment, females at this dose level consumed more food than any other group did; yet they did not add weight as fast as the controls (Table 99). It was not ascertained as to whether this increase resulted from increased acceptance of the diet containing condensate blend or whether the food was not actually consumed but was dislocated from the feeders by the mice. However, the latter explanation seems more probable because the increased consumption was recorded for only 2 of the 4 high-dose cages (the recovery groups; see Tables 107 and 111) and because a similar effect for the high-dose (0.10% condensate blend) females was not seen in the first week of the range-finding study on mice (Appendix G, Table G-22).

Tables 110 and 111 provide the 13-week food consumption data calculated on a body weight basis. By Week 3, food consumption at the high dose had fallen off and remained low (usually by as much as 10 or more g/kg body weight) throughout the treatment period for both sexes (significantly for females on Weeks 6, 8, and 9). Food consumption rates actually showed modest increases later in the study (Weeks 10 through 13) which may reflect adaptation to the treatment by these animals. During Weeks 5 through 9, when food intake rates for high dose mice were at their lowest, these mice actually had a net loss in body weight gain (Tables 98 and 99).

Food consumption data for recovery animals appear in Tables 106 through 109. The immediate increase in food consumption by male mice at the high dose during Week 5, the first week of recovery from the 4-week treatment, is significant (Table 106). Although the female mice at this level (Table 107) did not eat more than females in other groups during this week, they did increase their food consumption over

TABLE 104

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	W	.01 % IN DIET	W	.10 % IN DIET	W
WEEK 1	4.1 ± .622 (4)	4.3 ± .084 (4)		4.5 ± .171 (4)		4.0 ± .115 (4)	
WEEK 2	4.8 ± .079 (4)	5.0 ± .119 (4)		4.5 ± .125 (4)		4.5 ± .320 (4)	
WEEK 3	4.8 ± .158 (4)	5.0 ± .200 (4)		4.9 ± .223 (4)		4.2 ± .129 (4)	
WEEK 4	5.0 ± .062 (4)	5.2 ± .095 (4)		4.8 ± .263 (4)		4.0 ± .245 (4)	
WEEK 5	5.4 ± .010 (3)	5.1 ± .400 (2)		5.1 ± .114 (2)		4.3 ± .229 (2)	
WEEK 6	5.1 ± .197 (3)	5.1 ± .100 (2)		5.1 ± .129 (2)		3.5 ± .100 (2)	*
WEEK 7	5.0 ± .399 (3)	4.6 ± .443 (2)		4.8 ± .057 (2)		3.1 ± .043 (2)	
WEEK 8	5.5 ± .117 (3)	5.6 ± .286 (2)		5.8 ± .043 (2)		3.1 ± .114 (2)	*
WEEK 9	5.1 ± .129 (2)	5.5 ± .271 (2)		5.5 ± .286 (2)		3.6 ± .221 (2)	*
WEEK 10	5.4 ± .571 (2)	5.0 ± .471 (2)		5.4 ± .214 (2)		4.3 ± .878 (2)	
WEEK 11	5.2 ± .071 (2)	5.2 ± .343 (2)		4.9 ± .086 (2)		4.4 ± 1.39 (2)	
WEEK 12	5.2 ± .029 (2)	5.4 ± .114 (2)		5.1 ± .157 (2)		4.4 ± 1.26 (2)	
WEEK 13	5.4 ± .230 (2)	5.1 ± .147 (2)		5.6 ± .480 (2)		4.5 ± .994 (2)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 105

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 Z IN DIET	.01 Z IN DIET	.10 Z IN DIET
WEEK 1	2.4 ± .198 (4)	4.0 ± .167 (4)	4.0 ± .217 (4)	4.9 ± .789 (4)
WEEK 2	4.5 ± .220 (4)	4.5 ± .153 (4)	4.0 ± .164 (4)	4.2 ± .129 (4)
WEEK 3	4.7 ± .058 (4)	4.7 ± .281 (4)	4.6 ± .235 (4)	3.9 ± .101 (4)
WEEK 4	4.5 ± .146 (4)	4.8 ± .237 (4)	4.4 ± .319 (4)	3.9 ± .187 (4)
WEEK 5	4.9 ± .147 (3)	4.7 ± .257 (2)	4.4 ± .471 (2)	4.0 ± .433 (2)
WEEK 6	4.5 ± .094 (3)	4.2 ± .300 (2)	4.2 ± .400 (2)	3.3 ± .174 (2)
WEEK 7	4.2 ± .058 (3)	4.1 ± .429 (2)	4.2 ± .043 (2)	3.3 ± .273 (2)
WEEK 8	4.7 ± .190 (3)	4.7 ± .343 (2)	4.8 ± .200 (2)	3.4 ± .138 (2)
WEEK 9	5.1 ± .100 (2)	4.9 ± .371 (2)	4.7 ± .057 (2)	3.3 ± .071 (2) *
WEEK 10	4.7 ± .171 (2)	4.7 ± .143 (2)	5.1 ± .157 (2)	2.3 ± 1.43 (2) †
WEEK 11	4.4 ± .043 (2)	4.4 ± .100 (2)	4.7 ± .614 (2)	3.8 ± .300 (2)
WEEK 12	3.8 ± .543 (2)	4.5 ± .486 (2)	4.7 ± .229 (2)	3.3 ± .286 (2)
WEEK 13	5.2 ± .050 (2)	4.8 ± .197 (2)	5.1 ± .546 (2)	3.7 ± .190 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES

W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES

* CONFIDENCE LEVEL = .95

† Technician error in weighing (see Table 109).

TABLE 106
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	4.1 ± .622 (4)	4.2 (1)	4.8 (1)	4.1 (1)
WEEK 2	4.8 ± .079 (4)	4.7 (1)	4.8 (1)	5.4 (1)
WEEK 3	4.8 ± .158 (4)	5.5 (1)	5.4 (1)	4.5 (1)
WEEK 4	5.0 ± .062 (4)	5.3 (1)	5.3 (1)	4.4 (1)
WEEK 5	5.4 ± .010 (3)	5.5 (1)	5.6 (1)	6.2 (1)
WEEK 6	5.1 ± .197 (3)	5.1 (1)	5.3 (1)	5.7 (1)
WEEK 7	5.0 ± .399 (3)	5.1 (1)	5.5 (1)	5.2 (1)
WEEK 8	5.5 ± .117 (3)	6.2 (1)	5.7 (1)	6.1 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W - WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 107
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	W	.01 % IN DIET	W	.10 % IN DIET	W
WEEK 1	2.4 ± .198 (4)	4.5 (1)		4.1 (1)		6.4 (1)	
WEEK 2	4.5 ± .220 (4)	4.6 (1)		4.4 (1)		4.5 (1)	
WEEK 3	4.7 ± .058 (4)	5.4 (1)		5.2 (1)		4.1 (1)	
WEEK 4	4.5 ± .146 (4)	5.4 (1)		5.4 (1)		4.3 (1)	
WEEK 5	4.9 ± .147 (3)	5.7 (1)		5.5 (1)		5.3 (1)	
WEEK 6	4.5 ± .094 (3)	5.1 (1)		5.1 (1)		4.9 (1)	
WEEK 7	4.2 ± .058 (3)	5.3 (1)		4.9 (1)		4.5 (1)	
WEEK 8	4.7 ± .190 (3)	5.4 (1)		4.9 (1)		5.3 (1)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 108

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF MALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	W	.01 % IN DIET	W	.10 % IN DIET	W
WEEK 1	4.1 ± .622 (4)	4.2 (1)		4.8 (1)		4.3 (1)	
WEEK 2	4.8 ± .079 (4)	4.9 (1)		4.3 (1)		4.5 (1)	
WEEK 3	4.8 ± .158 (4)	4.6 (1)		4.4 (1)		4.1 (1)	
WEEK 4	5.0 ± .062 (4)	5.2 (1)		4.8 (1)		4.2 (1)	
WEEK 5	5.4 ± .010 (3)	4.7 (1)		5.0 (1)		4.5 (1)	
WEEK 6	5.1 ± .197 (3)	5.0 (1)		5.0 (1)		3.6 (1)	
WEEK 7	5.0 ± .399 (3)	4.1 (1)		4.7 (1)		3.2 (1)	
WEEK 8	5.5 ± .117 (3)	5.9 (1)		5.8 (1)		3.0 (1)	
WEEK 9	5.1 ± .129 (2)	5.2 (1)		5.8 (1)		3.9 (1)	
WEEK 10	5.4 ± .571 (2)	4.5 (1)		5.2 (1)		5.7 (1)	
WEEK 11	5.2 ± .071 (2)	5.5 (1)		5.0 (1)		6.6 (1)	
WEEK 12	5.2 ± .029 (2)	5.3 (1)		5.2 (1)		6.4 (1)	
WEEK 13	5.4 ± .230 (2)	5.0 (1)		5.2 (1)		6.0 (1)	
WEEK 14	6.0 (1)	6.1 (1)		6.9 (1)		5.7 (1)	
WEEK 15	4.4 (1)	5.0 (1)		5.2 (1)		5.9 (1)	
WEEK 16	5.3 (1)	5.0 (1)		4.4 (1)		6.9 (1)	
WEEK 17	5.1 (1)	5.3 (1)		5.7 (1)		6.3 (1)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES

W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES

* CONFIDENCE LEVEL = .95

TABLE 109

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/ANIMAL/DAY)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	2.4 ± .198 (4)	4.1 (1)	4.5 (1)	5.6 (1)
WEEK 2	4.5 ± .220 (4)	4.6 (1)	4.0 (1)	3.9 (1)
WEEK 3	4.7 ± .058 (4)	4.7 (1)	4.5 (1)	3.7 (1)
WEEK 4	4.5 ± .146 (4)	5.0 (1)	4.1 (1)	3.5 (1)
WEEK 5	4.9 ± .147 (3)	5.0 (1)	4.8 (1)	3.6 (1)
WEEK 6	4.5 ± .094 (3)	4.5 (1)	4.6 (1)	3.1 (1)
WEEK 7	4.2 ± .058 (3)	4.6 (1)	4.2 (1)	3.1 (1)
WEEK 8	4.7 ± .190 (3)	5.0 (1)	5.0 (1)	3.3 (1)
WEEK 9	5.1 ± .100 (2)	5.3 (1)	4.7 (1)	3.3 (1)
WEEK 10	4.7 ± .171 (2)	4.9 (1)	5.3 (1)	.9 (1) +
WEEK 11	4.4 ± .043 (2)	4.5 (1)	4.1 (1)	4.1 (1)
WEEK 12	3.8 ± .543 (2)	5.0 (1)	4.9 (1)	3.0 (1)
WEEK 13	5.2 ± .050 (2)	4.6 (1)	4.6 (1)	3.5 (1)
WEEK 14	4.9 (1)	5.2 (1)	5.0 (1)	4.5 (1)
WEEK 15	4.3 (1)	4.8 (1)	4.4 (1)	4.5 (1)
WEEK 16	4.2 (1)	4.3 (1)	4.1 (1)	4.2 (1)
WEEK 17	4.3 (1)	4.4 (1)	3.9 (1)	4.3 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES

W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES

* CONFIDENCE LEVEL = .95

+ Technician error in weighing.

TABLE 110
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET	W
WEEK 1	145.2 ± 21.8 (4)	153.7 ± 1.59 (4)	160.5 ± 4.75 (4)	149.5 ± 3.98 (4)	
WEEK 2	162.1 ± 3.09 (4)	166.6 ± 4.11 (4)	158.9 ± .913 (4)	158.7 ± 3.09 (4)	
WEEK 3	158.1 ± 7.03 (4)	159.0 ± 5.32 (4)	159.6 ± 2.95 (4)	148.5 ± 3.81 (4)	
WEEK 4	159.0 ± 3.01 (4)	161.0 ± 5.16 (4)	155.4 ± 3.97 (4)	142.8 ± 2.33 (4)	
WEEK 5	168.2 ± 4.76 (3)	162.6 ± .211 (2)	158.4 ± .874 (2)	148.9 ± 9.94 (2)	
WEEK 6	156.8 ± 8.67 (3)	155.6 ± 3.59 (2)	149.1 ± .601 (2)	123.7 ± 4.85 (2)	
WEEK 7	152.3 ± 5.31 (3)	142.6 ± 3.58 (2)	148.6 ± .531 (2)	116.0 ± 8.86 (2)	
WEEK 8	154.4 ± 5.77 (3)	166.7 ± 8.50 (2)	162.1 ± 3.77 (2)	117.3 ± 2.63 (2)	
WEEK 9	145.9 ± 7.80 (2)	156.2 ± 2.39 (2)	154.5 ± 7.61 (2)	118.4 ± 4.63 (2)	
WEEK 10	152.6 ± 9.70 (2)	146.0 ± 4.00 (2)	148.3 ± 3.86 (2)	139.6 ± 24.6 (2)	
WEEK 11	149.6 ± 5.21 (2)	155.2 ± 14.0 (2)	147.2 ± .809 (2)	141.7 ± 40.3 (2)	
WEEK 12	137.2 ± 1.79 (2)	150.8 ± .662 (2)	149.7 ± 1.99 (2)	136.2 ± 32.1 (2)	
WEEK 13	149.2 ± 1.43 (2)	144.4 ± 1.93 (2)	160.9 ± 13.3 (2)	141.8 ± 27.3 (2)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 111
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	93.9 ± 7.84 (4)	158.7 ± 3.84 (4)	164.8 ± 6.74 (4)	204.5 ± 35.5 (4)
WEEK 2	170.4 ± 7.77 (4)	169.1 ± 2.03 (4)	164.6 ± 5.33 (4)	167.2 ± 4.31 (4)
WEEK 3	169.7 ± 1.57 (4)	169.6 ± 4.40 (4)	175.3 ± 9.74 (4)	155.3 ± 2.35 (4)
WEEK 4	158.9 ± 4.04 (4)	166.6 ± 5.19 (4)	166.0 ± 10.2 (4)	151.9 ± 3.08 (4)
WEEK 5	170.1 ± 4.87 (3)	164.0 ± 1.52 (2)	150.2 ± .721 (2)	149.6 ± 9.97 (2)
WEEK 6	152.1 ± 1.61 (3)	142.2 ± 4.37 (2)	148.2 ± 3.14 (2)	127.3 ± 3.06 (2) *
WEEK 7	141.6 ± 2.63 (3)	140.1 ± 10.3 (2)	145.9 ± 3.08 (2)	126.2 ± 6.58 (2)
WEEK 8	155.6 ± 3.94 (3)	151.0 ± 3.27 (2)	160.5 ± .291 (2)	130.6 ± 1.45 (2) *
WEEK 9	161.5 ± 3.18 (2)	156.5 ± 1.87 (2)	153.3 ± 3.16 (2)	126.2 ± .914 (2) *
WEEK 10	153.5 ± 6.04 (2)	150.6 ± .724 (2)	162.6 ± 3.28 (1)	85.6 ± 51.5 (2)
WEEK 11	149.6 ± .069 (2)	142.9 ± .000 (2)	155.9 ± 22.4 (2)	137.4 ± 11.8 (2)
WEEK 12	124.6 ± 12.0 (2)	140.7 ± 8.15 (2)	144.6 ± 5.30 (2)	114.1 ± 6.96 (2)
WEEK 13	168.6 ± 3.23 (2)	149.0 ± 11.3 (2)	160.9 ± 21.4 (2)	126.5 ± 1.22 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
* WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

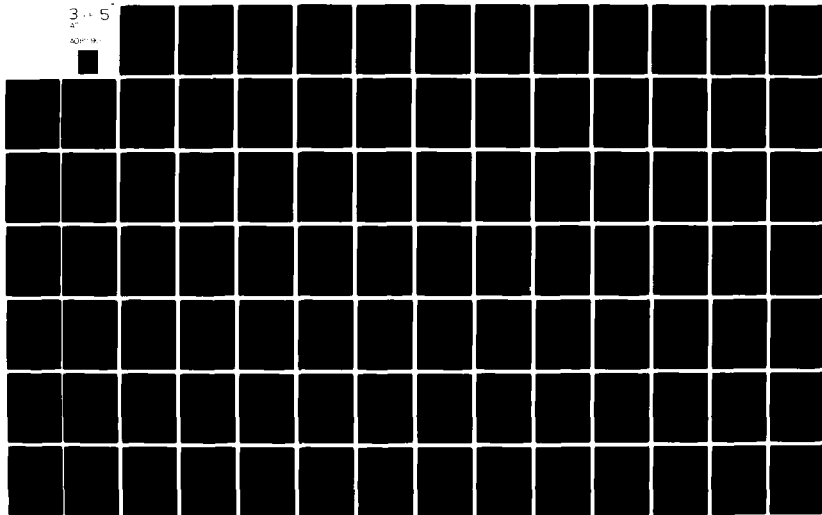
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SRI INTERNATIONAL MENLO PARK CA F/6 6/20
MAMMALIAN TOXICOLOGICAL EVALUATIONS OF TNT WASTEWATERS. VOLUME --ETC(U)
APR 79 J V DILLEY, C A TYSON, G W NEWELL DAMD17-76-C-6050
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Week 4 substantially more than any other female group did. In this sense, the effects on males and females during the first week of withdrawal from the treatment were the same; that is, food consumption was elevated relative to control and other treatment groups.

Females treated for 13 weeks at the 0.10% level also increased their food consumption more in the first week of recovery than any other female group did, but males did not (Tables 108 and 109). In the latter case, the males in the 0.10% condensate blend actually began eating more during Weeks 10 through 13, before treatment ended.

When the intake rates are compared on a body weight basis (Tables 110 through 115), no statistically significant differences are cited at the high dose. There was a noticeable, though temporary, increase in food intake for both males and females at this level during Week 5 that may be related to removal from the treatment (Tables 112 and 113). A similar change in food efficiency for animals at this level after 13 weeks of treatment is not indicated statistically, but the sum of the intake rates for the 4-week recovery weeks is noted to be higher for males and females in the high-dose groups than in their corresponding control (and other treatment) groups. This change may have been produced by discontinuation of the treatment. At the lower dose levels there are no consistent effects of treatment on food intake.

The actual doses of condensate water consumed in the diets of the mice were calculated. The data are given in Tables 116 and 117.

Organ Weights

Organ weights and weight ratios for mice killed after treatment are summarized in Tables 118 through 121. After four weeks, males at the 0.10% condensate blend level had significantly low testicular weights and testes-to-brain and testes-to-body weight ratios. These parameters were significantly different after 13 weeks also. Females at this level had enlarged spleens (not significantly so) at 4 and at 13 weeks. The spleen-to-weight ratios and (marginally) liver-to-brain weight ratios were cited statistically after 13 weeks of treatment. These were the only organ weight differences that appeared to be treatment-related.

Among mice allowed 4 weeks of recovery after 4 weeks of treatment (Tables 122 and 123), no alterations were seen. After the longer period of treatment (Tables 124 and 125), males at the high dose had depressed testes weights and weight ratios, indicating that recovery from this effect of treatment was not complete after 4 weeks. No significant differences were seen in female groups subjected to 13 weeks of treatment followed by 4 weeks of recovery.

TABLE 112
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET
WEEK 1	145.2 ± 21.8 (4)	149.0 (1)	160.0 (1)	141.9 (1)
WEEK 2	162.1 ± 3.09 (4)	160.3 (1)	159.0 (1)	167.9 (1)
WEEK 3	158.1 ± 7.03 (4)	174.3 (1)	159.7 (1)	142.9 (1)
WEEK 4	159.0 ± 3.01 (4)	163.0 (1)	151.9 (1)	138.4 (1)
WEEK 5	168.2 ± 4.76 (3)	159.5 (1)	151.4 (1)	175.3 (1)
WEEK 6	156.8 ± 8.67 (3)	150.5 (1)	135.5 (1)	157.6 (1)
WEEK 7	152.3 ± 5.31 (3)	146.1 (1)	143.6 (1)	140.9 (1)
WEEK 8	154.4 ± 5.77 (3)	174.2 (1)	142.9 (1)	159.8 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 113
EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE MICE DURING 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.001 % IN DIET	.01 % IN DIET	.10 % IN DIET	W
WEEK 1	93.9 ± 7.84 (4)	168.6 (1)	171.2 (1)	256.9 (1)	
WEEK 2	170.4 ± 7.77 (4)	170.2 (1)	180.0 (1)	172.5 (1)	
WEEK 3	169.7 ± 1.57 (4)	182.4 (1)	204.2 (1)	150.3 (1)	
WEEK 4	158.9 ± 4.04 (4)	175.1 (1)	196.0 (1)	156.5 (1)	
WEEK 5	170.1 ± 4.87 (3)	175.7 (1)	187.6 (1)	179.8 (1)	
WEEK 6	152.1 ± 1.61 (3)	152.2 (1)	168.1 (1)	155.7 (1)	
WEEK 7	141.6 ± 2.63 (3)	156.3 (1)	157.5 (1)	149.4 (1)	
WEEK 8	155.6 ± 3.94 (3)	155.2 (1)	160.6 (1)	164.3 (1)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 114

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF MALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.001 Z IN DIET	W	.01 Z IN DIET	W
WEEK 1	145.2 ± 21.8 (4)	155.5 (1)		172.9 (1)	158.8 (1)
WEEK 2	162.1 ± 3.09 (4)	170.6 (1)		161.1 (1)	160.0 (1)
WEEK 3	158.1 ± 7.03 (4)	156.6 (1)		151.7 (1)	143.8 (1)
WEEK 4	159.0 ± 3.01 (4)	170.1 (1)		166.5 (1)	149.0 (1)
WEEK 5	168.2 ± 4.76 (3)	162.8 (1)		159.2 (1)	158.8 (1)
WEEK 6	156.8 ± 8.67 (3)	159.2 (1)		149.7 (1)	128.6 (1)
WEEK 7	152.3 ± 5.31 (3)	139.0 (1)		149.1 (1)	124.9 (1)
WEEK 8	154.4 ± 5.77 (3)	175.2 (1)		165.8 (1)	119.9 (1)
WEEK 9	145.9 ± 7.80 (2)	153.8 (1)		162.1 (1)	124.4 (1)
WEEK 10	152.6 ± 9.70 (2)	142.0 (1)		144.5 (1)	178.6 (1)
WEEK 11	149.6 ± 5.21 (2)	169.1 (1)		148.0 (1)	205.4 (1)
WEEK 12	137.2 ± 1.79 (2)	150.1 (1)		147.7 (1)	187.0 (1)
WEEK 13	149.2 ± 1.43 (2)	146.2 (1)		148.6 (1)	181.8 (1)
WEEK 14	150.0 (1)	157.2 (1)		170.0 (1)	176.9 (1)
WEEK 15	107.8 (1)	125.6 (1)		126.8 (1)	172.1 (1)
WEEK 16	132.8 (1)	125.6 (1)		120.9 (1)	195.2 (1)
WEEK 17	129.6 (1)	137.9 (1)		147.6 (1)	173.5 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

TABLE 115

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION (G/KG (BODY WT)/DAY)
OF FEMALE MICE DURING 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS			
		.001 % IN DIET	W	.01 % IN DIET	.10 % IN DIET
WEEK 1	93.9 ± 7.84 (4)	160.9 (1)		180.6 (1)	244.7 (1)
WEEK 2	170.4 ± 7.77 (4)	169.1 (1)		158.7 (1)	159.4 (1)
WEEK 3	169.7 ± 1.57 (4)	167.0 (1)		167.2 (1)	152.3 (1)
WEEK 4	158.9 ± 4.04 (4)	174.6 (1)		152.3 (1)	142.9 (1)
WEEK 5	170.1 ± 4.87 (3)	165.6 (1)		150.9 (1)	140.6 (1)
WEEK 6	152.1 ± 1.61 (3)	146.6 (1)		151.3 (1)	124.6 (1)
WEEK 7	141.6 ± 2.63 (3)	150.4 (1)		142.9 (1)	120.4 (1)
WEEK 8	155.6 ± 3.94 (3)	154.3 (1)		160.3 (1)	129.3 (1)
WEEK 9	161.5 ± 3.18 (2)	158.3 (1)		150.1 (1)	125.3 (1)
WEEK 10	153.5 ± 6.04 (2)	149.9 (1)		159.3 (1)	34.1 (1)
WEEK 11	149.6 ± .069 (2)	142.9 (1)		133.5 (1)	149.1 (1)
WEEK 12	124.6 ± 12.0 (2)	148.8 (1)		149.9 (1)	107.1 (1)
WEEK 13	168.6 ± 3.23 (2)	138.5 (1)		141.1 (1)	125.4 (1)
WEEK 14	150.4 (1)	151.3 (1)		148.7 (1)	154.2 (1)
WEEK 15	124.3 (1)	131.1 (1)		127.9 (1)	141.5 (1)
WEEK 16	125.9 (1)	121.9 (1)		121.0 (1)	133.8 (1)
WEEK 17	125.4 (1)	125.0 (1)		124.7 (1)	134.9 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH N OF CAGES IN PARENTHESES
W = WILLIAMS TEST OF SIGNIFICANT CONTROL-TREATMENT DIFFERENCES
* CONFIDENCE LEVEL = .95

Table 116

DOSES OF CONDENSATE WATER [mg/kg (body weight)/day] IN DIETS
CONSUMED BY MALE MICE DURING 13 WEEKS OF TREATMENT

Week	Treatment Groups*		
	0.001% in Diet	0.01% in Diet	0.10% in Diet
1	1.08	15.5	137.5
2	1.17	15.3	146.0
3	1.13	10.1	99.5
4	1.14	9.8	95.6
5	1.16	10.0	99.8
6	1.23	11.9	106.4
7	1.13	11.9	99.8
8	1.32	13.0	100.9
9	1.23	12.4	101.8
10	1.05	11.8	120.1
11	1.12	11.8	121.9
12	1.25	13.8	125.3
13	<u>1.20</u>	<u>14.8</u>	<u>130.5</u>
Average Dose	1.17	12.5	114.2

* Daily food consumption x analytical concentration
of condensate water in feed.

Table 117

DOSES OF CONDENSATE WATER [mg/kg (body weight)/day] IN DIETS
CONSUMED BY FEMALE MICE DURING 13 WEEKS OF TREATMENT

Week	Treatment Groups*		
	0.001% in Diet	0.01% in Diet	0.10% in Diet
1	1.11	15.8	188.1
2	1.18	15.8	153.8
3	1.21	11.0	104.1
4	1.19	10.5	101.8
5	1.16	9.5	100.2
6	1.12	11.8	109.5
7	1.11	11.7	108.5
8	1.19	12.9	112.3
9	1.23	12.2	108.5
10	1.09	13.4	73.6
11	1.03	12.5	118.2
12	1.17	13.3	105.0
13	<u>1.24</u>	<u>14.8</u>	<u>116.4</u>
Average Dose	1.16	12.7	115.4

* Daily food consumption x analytical concentration
of condensate water in the feed.

TABLE 118

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			T R	.001 Z IN DIET	.01 Z IN DIET	.10 Z IN DIET
FINAL WEIGHT	*	33.80 ± .735 (5)		33.80 ± .663 (5)	27.40 ± 2.50 (5)	23.00 ± 3.35 (5) *
BRAIN		.51 ± .027 (5)		.49 ± .017 (5)	.41 ± .012 (5)	.45 ± .030 (5) A
HEART		.17 ± .010 (5)		.17 ± .007 (5)	.19 ± .029 (5)	.13 ± .020 (5) B
LIVER		2.17 ± .087 (5)		2.07 ± .085 (5)	1.62 ± .151 (5)	1.45 ± .278 (5) A
SPLEEN	+	.13 ± .006 (5)		.10 ± .006 (5)	.19 ± .036 (5)	.12 ± .034 (5)
KIDNEYS		.55 ± .040 (5)		.50 ± .018 (5)	.39 ± .052 (5)	.35 ± .063 (5) A
TESTES		.27 ± .009 (5)		.24 ± .013 (5)	.20 ± .007 (5)	.09 ± .013 (5) + D
BRAIN/BODY		15.26 ± .000 (5)		14.65 ± .683 (5)	15.45 ± .940 (5)	20.59 ± 1.65 (5) *
HEART/BODY		5.09 ± .268 (5)		5.11 ± .298 (5)	6.85 ± .622 (5)	5.60 ± .398 (5)
LIVER/BODY		64.09 ± 2.13 (5)		61.33 ± 2.37 (5)	59.22 ± 2.03 (5)	61.34 ± 2.91 (5)
SPLEEN/BODY	*	3.98 ± .227 (5)		2.97 ± .188 (5)	7.08 ± 1.29 (5)	4.73 ± .859 (5)
KIDNEYS/BODY		16.45 ± 1.32 (5)		14.72 ± .731 (5)	14.22 ± .706 (5)	15.08 ± .767 (5)
TESTES/BODY		7.88 ± .287 (5)		7.01 ± .481 (5)	7.37 ± .404 (5)	3.93 ± .150 (5) + C
HEART/BRAIN		.34 ± .022 (5)		.35 ± .022 (5)	.45 ± .056 (5)	.28 ± .026 (5) A
LIVER/BRAIN		4.25 ± .226 (5)		4.23 ± .281 (5)	3.89 ± .277 (5)	3.11 ± .411 (5)
SPLEEN/BRAIN	*	.26 ± .015 (5)		.20 ± .015 (5)	.45 ± .080 (5)	.25 ± .060 (5)
KIDNEYS/BRAIN		1.10 ± .113 (5)		1.01 ± .031 (5)	.94 ± .103 (5)	.76 ± .086 (5) A
TESTES/BRAIN		.52 ± .023 (5)		.48 ± .034 (5)	.48 ± .008 (5)	.20 ± .017 (5) + D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A, 20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 119

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET	T R	.01 % IN DIET	T R	.10 % IN DIET	T R
FINAL WEIGHT		30.60 ± .812 (5)	29.80 ± .800 (5)		27.80 ± 2.11 (5)		27.20 ± 1.83 (5)	
BRAIN		.53 ± .017 (5)	.53 ± .020 (5)		.52 ± .022 (5)		.50 ± .012 (5)	
HEART		.17 ± .011 (5)	.16 ± .009 (5)		.14 ± .012 (5)	A	.15 ± .015 (5)	A
LIVER		2.05 ± .042 (5)	1.73 ± .075 (5)		1.61 ± .160 (5)		1.92 ± .172 (5)	
SPLEEN	+	.13 ± .004 (5)	.13 ± .020 (5)		.14 ± .015 (5)		.21 ± .052 (5)	
KIDNEYS		.42 ± .014 (5)	.40 ± .025 (5)		.36 ± .034 (5)	A	.36 ± .022 (5)	A
BRAIN/BODY		17.26 ± .839 (5)	17.78 ± .908 (5)		18.77 ± .859 (5)		18.77 ± 1.23 (5)	
HEART/BODY		5.52 ± .418 (5)	5.25 ± .347 (5)		5.10 ± .147 (5)		5.48 ± .275 (5)	
LIVER/BODY		66.98 ± 1.61 (5)	57.95 ± 1.62 (5)		57.77 ± 2.69 (5)		70.22 ± 2.89 (5)	
SPLEEN/BODY	*	4.19 ± .149 (5)	4.22 ± .621 (5)		5.16 ± .514 (5)		7.41 ± 1.41 (5)	
KIDNEYS/BODY		13.63 ± .584 (5)	13.29 ± .755 (5)		12.91 ± .539 (5)		13.41 ± .275 (5)	
HEART/BRAIN		.32 ± .014 (5)	.30 ± .011 (5)		.27 ± .018 (5)	A	.30 ± .028 (5)	
LIVER/BRAIN		3.90 ± .128 (5)	3.28 ± .144 (5)		3.11 ± .228 (5)		3.83 ± .375 (5)	
SPLEEN/BRAIN	+	.24 ± .007 (5)	.24 ± .031 (5)		.28 ± .026 (5)		.42 ± .105 (5)	
KIDNEYS/BRAIN		.79 ± .034 (5)	.75 ± .029 (5)		.70 ± .051 (5)	A	.72 ± .040 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 120

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE MICE AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
FINAL WEIGHT		34.60 ± 2.58 (5)	35.40 ± .678 (5)		34.00 ± 1.14 (5)	29.00 ± 2.21 (5)
BRAIN		.53 ± .014 (5)	.55 ± .020 (5)		.54 ± .024 (5)	.52 ± .034 (5)
HEART		.18 ± .017 (5)	.21 ± .018 (5)	A	.21 ± .022 (5)	.18 ± .013 (5)
LIVER		1.51 ± .104 (5)	1.62 ± .044 (5)		1.64 ± .115 (5)	1.61 ± .158 (5)
SPLEEN	+	.11 ± .018 (5)	.11 ± .004 (5)		.10 ± .006 (5)	.19 ± .046 (5)
KIDNEYS	*	.54 ± .011 (5)	.57 ± .019 (5)		.55 ± .049 (5)	.51 ± .050 (5)
TESTES		.25 ± .022 (5)	.24 ± .005 (5)		.24 ± .013 (5)	.11 ± .012 (5) + D
BRAIN/BODY		15.51 ± 1.10 (5)	15.69 ± .756 (5)		15.91 ± .665 (5)	18.50 ± 2.07 (5)
HEART/BODY		5.33 ± .984 (5)	5.97 ± .620 (5)		6.22 ± .553 (5)	6.10 ± .270 (5)
LIVER/BODY		44.24 ± 3.42 (5)	45.95 ± 1.99 (5)		48.08 ± 2.25 (5)	55.52 ± 2.99 (5)
SPLEEN/BODY	+	3.27 ± .756 (5)	3.05 ± .079 (5)		3.06 ± .143 (5)	6.11 ± 1.25 (5)
KIDNEYS/BODY		15.84 ± 1.22 (5)	16.27 ± .833 (5)		16.17 ± .915 (5)	17.55 ± 1.30 (5)
TESTES/BODY		7.30 ± .413 (5)	6.86 ± .268 (5)		7.20 ± .404 (5)	4.01 ± .803 (5) + B
HEART/BRAIN		.34 ± .037 (5)	.38 ± .020 (5)	A	.39 ± .027 (5)	.34 ± .032 (5)
LIVER/BRAIN		2.86 ± .117 (5)	2.93 ± .051 (5)		3.03 ± .129 (5)	3.09 ± .222 (5)
SPLEEN/BRAIN	+	.20 ± .032 (5)	.20 ± .008 (5)		.19 ± .007 (5)	.36 ± .089 (5)
KIDNEYS/BRAIN		1.02 ± .033 (5)	1.04 ± .017 (5)		1.03 ± .078 (5)	.97 ± .057 (5)
TESTES/BRAIN		.48 ± .041 (5)	.44 ± .016 (5)		.46 ± .032 (5)	.21 ± .019 (5) + D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

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BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 121

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000X/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
FINAL WEIGHT		28.80 ± .860 (5)	29.60 ± 1.03 (5)		29.40 ± .748 (5)	29.00 ± 1.22 (4)
BRAIN		.57 ± .034 (5)	.55 ± .028 (5)		.53 ± .012 (5)	.54 ± .029 (4)
HEART		.16 ± .013 (5)	.17 ± .010 (5)		.17 ± .017 (5)	.18 ± .024 (4)
LIVER		1.40 ± .119 (5)	1.46 ± .128 (5)		1.42 ± .074 (5)	1.67 ± .126 (4)
SPLEEN		.11 ± .013 (5)	.10 ± .020 (5)		.10 ± .014 (5)	.19 ± .021 (4)
KIDNEYS		.41 ± .048 (5)	.43 ± .058 (5)		.43 ± .030 (5)	.44 ± .043 (4)
BRAIN/BODY		19.81 ± .668 (5)	18.68 ± .360 (5)		18.11 ± .337 (5)	18.72 ± .727 (4)
HEART/BODY		5.46 ± .323 (5)	5.61 ± .287 (5)		5.81 ± .656 (5)	6.31 ± .572 (4)
LIVER/BODY		48.20 ± 2.64 (5)	48.93 ± 2.92 (5)		48.52 ± 2.65 (5)	57.28 ± 2.25 (4)
SPLEEN/BODY		3.86 ± .364 (5)	3.38 ± .542 (5)		3.46 ± .447 (5)	6.45 ± .666 (4)
KIDNEYS/BODY		14.03 ± 1.18 (5)	14.41 ± 1.56 (5)		14.75 ± .901 (5)	15.00 ± .981 (4)
HEART/BRAIN		.28 ± .012 (5)	.30 ± .016 (5)		.32 ± .035 (5)	.34 ± .035 (4)
LIVER/BRAIN		2.43 ± .079 (5)	2.61 ± .113 (5)		2.68 ± .140 (5)	3.07 ± .122 (4)
SPLEEN/BRAIN		.19 ± .016 (5)	.18 ± .025 (5)		.19 ± .026 (5)	.35 ± .034 (4)
KIDNEYS/BRAIN		.70 ± .040 (5)	.77 ± .071 (5)		.81 ± .045 (5)	.80 ± .043 (4)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 122

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE MICE AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS				T R	T R	T R	T R	T R
			.001 % IN DIET	T R	.01 % IN DIET	T R					.10 % IN DIET
FINAL WEIGHT		36.60 ± 1.03 (5)	35.60 ± 1.08 (5)		40.00 ± .775 (5)					38.00 ± 1.47 (4)	
BRAIN		.54 ± .015 (5)	.56 ± .015 (5)		.60 ± .015 (5)		A			.57 ± .016 (4)	
HEART		.21 ± .004 (5)	.22 ± .010 (5)		.28 ± .014 (5)		+ B			.23 ± .015 (4)	A
LIVER		2.10 ± .082 (5)	2.32 ± .111 (5)		2.61 ± .078 (5)		*			2.36 ± .168 (4)	
SPLEEN	+	.10 ± .015 (5)	.13 ± .012 (5)		.13 ± .017 (5)					.27 ± .108 (4)	
KIDNEYS		.51 ± .036 (5)	.62 ± .022 (5)	A	.67 ± .043 (5)	B				.62 ± .067 (4)	B
TESTES		.24 ± .021 (5)	.22 ± .034 (5)		.26 ± .013 (5)	A				.23 ± .016 (4)	
BRAIN/BODY		14.68 ± .455 (5)	15.84 ± .618 (5)		15.05 ± .660 (5)					15.18 ± .561 (4)	
HEART/BODY		5.66 ± .257 (5)	6.30 ± .286 (5)		6.97 ± .412 (5)					6.12 ± .287 (4)	
LIVER/BODY		57.53 ± 1.81 (5)	65.17 ± 1.40 (5)		65.31 ± 2.02 (5)					62.03 ± 2.04 (4)	
SPLEEN/BODY	+	2.73 ± .387 (5)	3.54 ± .333 (5)		3.26 ± .426 (5)					7.11 ± 2.95 (4)	
KIDNEYS/BODY		14.00 ± .709 (5)	17.30 ± .328 (5)		16.68 ± 1.14 (5)					16.20 ± 1.13 (4)	
TESTES/BODY		6.51 ± .533 (5)	6.24 ± .887 (5)		6.63 ± .419 (5)					6.13 ± .395 (4)	
HEART/BRAIN		.39 ± .015 (5)	.40 ± .021 (5)		.46 ± .022 (5)	B				.40 ± .023 (4)	
LIVER/BRAIN		3.92 ± .096 (5)	4.14 ± .190 (5)		4.36 ± .175 (5)					4.11 ± .223 (4)	
SPLEEN/BRAIN	+	.19 ± .025 (5)	.22 ± .017 (5)		.22 ± .028 (5)					.48 ± .206 (4)	
KIDNEYS/BRAIN		.96 ± .052 (5)	1.10 ± .032 (5)		1.11 ± .073 (5)					1.08 ± .100 (4)	
TESTES/BRAIN		.44 ± .035 (5)	.40 ± .063 (5)		.44 ± .015 (5)					.40 ± .026 (4)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,

20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 123

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 %		.01 %		.10 %	
			IN DIET		IN DIET		IN DIET	
			T	R	T	R	T	R
FINAL WEIGHT		31.40 ± 1.17 (5)	34.60 ± 1.17 (5)		30.60 ± 1.44 (5)		32.00 ± .633 (5)	
BRAIN		.56 ± .018 (5)	.55 ± .026 (5)		.54 ± .025 (5)		.56 ± .020 (5)	
HEART		.18 ± .004 (5)	.19 ± .010 (5)		.18 ± .004 (5)		.18 ± .013 (5)	
LIVER		2.03 ± .097 (5)	2.24 ± .073 (5)		1.93 ± .072 (5)		2.10 ± .075 (5)	
SPLEEN		.13 ± .015 (5)	.14 ± .006 (5)	A	.14 ± .017 (5)		.14 ± .011 (5)	A
KIDNEYS		.45 ± .041 (5)	.44 ± .017 (5)		.41 ± .036 (5)		.44 ± .012 (5)	
BRAIN/BODY		18.02 ± .962 (5)	15.91 ± 1.13 (5)		17.74 ± .463 (5)		17.47 ± .738 (5)	
HEART/BODY		5.84 ± .290 (5)	5.55 ± .177 (5)		6.06 ± .286 (5)		5.65 ± .449 (5)	
LIVER/BODY		65.09 ± 3.86 (5)	65.03 ± 2.75 (5)		63.44 ± 2.05 (5)		65.65 ± 2.17 (5)	
SPLEEN/BODY		4.03 ± .464 (5)	4.06 ± .159 (5)		4.46 ± .368 (5)		4.36 ± .280 (5)	
KIDNEYS/BODY		14.40 ± 1.54 (5)	12.75 ± .509 (5)		13.25 ± .675 (5)		13.73 ± .601 (5)	
HEART/BRAIN		.32 ± .009 (5)	.36 ± .033 (5)	A	.34 ± .019 (5)		.32 ± .021 (5)	
LIVER/BRAIN		3.61 ± .105 (5)	4.14 ± .226 (5)		3.59 ± .148 (5)		3.77 ± .083 (5)	
SPLEEN/BRAIN		.22 ± .020 (5)	.26 ± .018 (5)	A	.25 ± .020 (5)	A	.25 ± .021 (5)	A
KIDNEYS/BRAIN		.79 ± .047 (5)	.81 ± .037 (5)		.75 ± .033 (5)		.79 ± .034 (5)	

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95
+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 124

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE MICE AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T	R	T	R	T	R
FINAL WEIGHT		37.40 ± 1.29 (5)	36.40 ± 1.54 (5)		36.20 ± 1.96 (5)		26.00 ± 4.38 (4)	* A
BRAIN		.54 ± .022 (5)	.55 ± .019 (5)		.55 ± .030 (5)		.50 ± .029 (4)	
HEART		.22 ± .015 (5)	.21 ± .014 (5)		.22 ± .016 (5)		.17 ± .030 (4)	B
LIVER		1.76 ± .085 (5)	1.64 ± .104 (5)		1.71 ± .086 (5)		1.41 ± .308 (4)	
SPLEEN	*	.13 ± .019 (5)	.11 ± .004 (5)		.12 ± .010 (5)		.09 ± .031 (4)	
KIDNEYS		.57 ± .053 (5)	.50 ± .033 (5)	A	.52 ± .013 (5)		.41 ± .066 (4)	B
TESTES		.23 ± .024 (5)	.23 ± .022 (5)		.27 ± .015 (5)	A	.12 ± .032 (4)	* C
BRAIN/BODY	*	14.50 ± .750 (5)	15.20 ± .313 (5)		15.18 ± .627 (5)		20.66 ± 2.45 (4)	
HEART/BODY		6.01 ± .446 (5)	5.65 ± .274 (5)		6.05 ± .465 (5)		6.42 ± .350 (4)	
LIVER/BODY		47.24 ± 1.96 (5)	44.93 ± 1.34 (5)		47.19 ± 1.01 (5)		52.50 ± 3.28 (4)	
SPLEEN/BODY	*	3.38 ± .483 (5)	2.97 ± .080 (5)		3.42 ± .219 (5)		3.17 ± .672 (4)	
KIDNEYS/BODY		15.19 ± 1.41 (5)	13.60 ± .547 (5)		14.61 ± .709 (5)		15.90 ± 1.01 (4)	
TESTES/BODY		6.20 ± .704 (5)	6.22 ± .358 (5)		7.47 ± .210 (5)		4.37 ± .515 (4)	
HEART/BRAIN		.41 ± .020 (5)	.37 ± .022 (5)	A	.40 ± .031 (5)		.32 ± .044 (4)	B
LIVER/BRAIN		3.31 ± .281 (5)	2.97 ± .145 (5)		3.13 ± .131 (5)		2.71 ± .469 (4)	
SPLEEN/BRAIN	*	.24 ± .046 (5)	.20 ± .005 (5)		.23 ± .024 (5)		.17 ± .053 (4)	
KIDNEYS/BRAIN		1.07 ± .140 (5)	.90 ± .037 (5)		.97 ± .066 (5)		.80 ± .091 (4)	
TESTES/BRAIN		.43 ± .062 (5)	.41 ± .031 (5)		.50 ± .031 (5)	A	.23 ± .052 (4)	C

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

B/C = BARTLETT'S CHI-SQUARE; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 125

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
FINAL WEIGHT		32.20 ± 1.07 (5)	32.60 ± .600 (5)		31.40 ± 1.36 (5)	29.80 ± 1.98 (5)
BRAIN	*	.53 ± .053 (5)	.58 ± .018 (5)		.56 ± .016 (5)	.56 ± .008 (5)
HEART		.21 ± .048 (5)	.17 ± .023 (5)	B	.18 ± .018 (5)	.15 ± .013 (5)
LIVER	*	1.50 ± .045 (5)	1.52 ± .037 (5)		1.34 ± .112 (5)	1.44 ± .148 (5)
SPLEEN		.14 ± .008 (5)	.12 ± .011 (5)	A	.11 ± .019 (5)	.12 ± .021 (5)
KIDNEYS		.45 ± .017 (5)	.42 ± .011 (5)		.39 ± .027 (5)	.39 ± .045 (5)
BRAIN/BODY	*	16.50 ± 1.78 (5)	17.90 ± .322 (5)		17.78 ± .561 (5)	19.07 ± 1.30 (5)
HEART/BODY		6.57 ± 1.32 (5)	5.05 ± .600 (5)		5.61 ± .555 (5)	4.92 ± .314 (5)
LIVER/BODY		46.49 ± .473 (5)	46.72 ± 1.66 (5)		42.45 ± 2.22 (5)	47.75 ± 2.06 (5)
SPLEEN/BODY		4.25 ± .306 (5)	3.75 ± .328 (5)		3.37 ± .424 (5)	4.00 ± .453 (5)
KIDNEYS/BODY		13.92 ± .294 (5)	12.84 ± .406 (5)		12.41 ± .548 (5)	12.85 ± .711 (5)
HEART/BRAIN	*	.41 ± .079 (5)	.28 ± .032 (5)		.31 ± .027 (5)	.26 ± .019 (5)
LIVER/BRAIN	*	3.01 ± .448 (5)	2.61 ± .104 (5)		2.40 ± .146 (5)	2.57 ± .265 (5)
SPLEEN/BRAIN		.27 ± .038 (5)	.21 ± .020 (5)	B	.19 ± .028 (5)	.22 ± .038 (5)
KIDNEYS/BRAIN	*	.91 ± .149 (5)	.72 ± .035 (5)		.70 ± .029 (5)	.69 ± .080 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

Hematology

The hematological data for the mice is presented in Tables 126 through 133. At the 4-week sacrifice, an unexpected clotting problem arose, and it was re-experienced at the 8-week sacrifice, despite the use of fresh Vacutainers and extra EDTA anticoagulant, the problem was substantially resolved by changing the technique of cardiac puncture. Instead of making the cardiac puncture from the outside of the intact thorax, the thorax was opened and the needle inserted directly into the heart.

Several parameters for the two female specimens at the 0.01% treatment level are cited statistically (Table 127). Although only the percent reticulocytes appeared to be outside the normal range, the low RBC, hemoglobin, and hematocrit combined with enlarged MCV and high reticulocytes suggests that, as in the case of rats, a mild compensatory anemia existed in mice at this level. The male sample at 0.10% was not abnormal except for the Hgb value (high), but being the only specimen this dose level cannot be analyzed statistically. At the 0.01% level similar differences in hematological values to those observed for the females are noted. At the 0.001% level, however, there was no effect cited, except for male WBC. No toxicological significance can be attached to this result, as the value is well within the normal range. Similar results were obtained in the earlier range-finding study (Appendix G, Table G-25). The combined hematological results of the two studies lead to the conclusion that there may be treatment-related effects at the 0.10% and possibly the 0.01% levels.

After 13 weeks of treatment, however, no differences in hematological parameters are observed (Tables 124 and 125). Atypical lymphocytes were low for all male treatment groups, but this derives from the high control mean at this sacrifice. All of these values were within the normal range for this parameter in our experience. Although percent band cells is statistically high for males at the 0.01% treatment level, band counts (WBC x % bands) are not excessive because of the low leukocyte count for this particular group. The only other observations of note were the higher percent PMN and reticulocytes and lower percent lymphocytes in the males at the 0.001% and 0.01% levels. None of these were sufficiently severe to suggest a relationship to treatment.

In mice allowed recovery following 4 weeks of treatment (Tables 130 and 131), the male specimen at the high dose had significantly low RBC, hemoglobin, and hematocrit and MCV tended to be high. This mouse was still suffering from anemia at the time of death. All other treatment groups, male or female, had normal hematological parameters.

Similar observations apply to the hematological values on mice treated for 13 weeks prior to recovery (Tables 132 and 133). Although no statistically significant changes were observed, RBC, hemoglobin,

TABLE 126

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET		.01 % IN DIET	
			T	R	T	R
						.10 % IN DIET
RBC (X 10 ⁶)	*	7.53 ± .066 (4)	7.88 ± .225 (2)		6.58 ± .510 (4)	8.85 ± 0.00 (1) + A
HGB (G %)	*	13.48 ± .160 (4)	13.70 ± .200 (2)		11.82 ± .837 (4)	16.30 ± 0.00 (1) + A
HCT (%)		37.25 ± 1.03 (4)	39.00 ± 1.00 (2)		34.50 ± 2.40 (4)	43.00 ± 0.00 (1)
MCV (U) ³		50.25 ± 1.03 (4)	51.00 ± 0.00 (2)		53.50 ± 1.44 (4)	50.00 ± 0.00 (1)
MCH (DUG)		18.00 ± .408 (4)	17.50 ± .500 (2)		18.25 ± .250 (4)	18.00 ± 0.00 (1)
MCHC (%)		36.25 ± .250 (4)	36.00 ± 1.00 (2)		34.75 ± .479 (4)	37.00 ± 0.00 (1)
WBC (X 10 ³)	*	4.77 ± .477 (4)	6.58 ± .100 (2)	*	6.31 ± 1.59 (4)	4.20 ± 0.00 (1)
PMN (%)		25.25 ± 1.55 (4)	50.50 ± 3.50 (2)		41.25 ± 6.25 (4)	56.00 ± 0.00 (1)
BANDS (%)		0.00 ± 0.00 (4)	0.00 ± 0.00 (2)	x	.25 ± .250 (4)	1.00 ± 0.00 (1) x
LYMPH (%)		67.00 ± 1.58 (4)	43.00 ± 3.00 (2)	A	53.75 ± 6.25 (4)	39.00 ± 0.00 (1) A
ATYP LYMPH(%)		1.25 ± .750 (4)	1.00 ± 1.00 (2)	x	1.00 ± .577 (4)	0.00 ± 0.00 (1) x
MONO (%)		4.75 ± .250 (4)	4.00 ± 0.00 (2)		3.25 ± .750 (4)	3.00 ± 0.00 (1)
EOSIN (%)		1.25 ± .250 (4)	1.50 ± .500 (2)		.25 ± .250 (4)	1.00 ± 0.00 (1) B
BASO (%)		0.00 ± 0.00 (4)	0.00 ± 0.00 (2)		0.00 ± 0.00 (4)	0.00 ± 0.00 (1)
RETICS (%)	*	1.20 ± .082 (4)	1.50 ± .500 (2)		3.80 ± .934 (4)	1.20 ± 0.00 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 127

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 Z IN DIET	T R	.01 Z IN DIET	T R
RBC (X 10 ⁶)		8.11 ± 0.00 (2)	8.58 ± .191 (3)			6.77 ± .500 (2) +
HGB (G Z)		14.00 ± .100 (2)	14.90 ± .265 (3)			13.80 ± 1.80 (2) +
HCT (Z)		41.00 ± 1.00 (2)	42.00 ± 0.00 (3)			36.50 ± 1.50 (2) +
MCV (U) ³		52.00 ± 1.00 (2)	50.33 ± .333 (3)			54.50 ± 1.50 (2) +
MCH (UUG)		17.00 ± 0.00 (2)	17.33 ± .333 (3)			20.50 ± 1.50 (2) +
MCHC (Z)		34.00 ± 1.00 (2)	36.00 ± 0.00 (3)			38.00 ± 4.00 (2) +
WBC (X 10 ³)		3.39 ± .335 (2)	8.12 ± 1.63 (3)	x		6.09 ± .685 (2) x
PMN (Z)		24.50 ± .500 (2)	22.33 ± 1.20 (3)			16.50 ± 1.50 (2) + A
BANDS (Z)		0.00 ± 0.00 (2)	0.00 ± 0.00 (3)			0.00 ± 0.00 (2)
LYMPH (Z)		70.00 ± 0.00 (2)	67.00 ± 1.73 (3)			75.00 ± 1.00 (2) +
ATYP LYMPH(Z)		.50 ± .500 (2)	3.67 ± .333 (3)	x		3.00 ± 1.00 (2) x
MONO (Z)		3.50 ± .500 (2)	4.00 ± 0.00 (3)			5.00 ± 1.00 (2) *
EOSIN (Z)		1.50 ± .500 (2)	3.00 ± .577 (3)	x		.50 ± .500 (2) x
BASO (Z)		0.00 ± 0.00 (2)	0.00 ± 0.00 (3)			0.00 ± 0.00 (2)
RETICS (Z)		1.70 ± .100 (2)	2.33 ± .067 (3)			7.75 ± .750 (2) D

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95
+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 128

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
RBC (X 10 ⁶)	*	6.49 ± .555 (3)	7.15 ± .083 (5)		6.98 ± .122 (4)	7.04 ± .327 (5)
HGB (G %)		11.87 ± 1.22 (3)	12.64 ± .248 (5)		12.55 ± .260 (4)	13.48 ± .637 (5)
HCT (Z)		34.67 ± 3.53 (3)	35.60 ± .748 (5)		35.50 ± .957 (4)	37.00 ± 1.76 (5)
MCV (U) ³	*	54.00 ± 1.73 (3)	52.00 ± 1.10 (5)		52.00 ± .707 (4)	51.00 ± 3.13 (5)
MCH (UUG)		18.67 ± .333 (3)	17.60 ± .245 (5)		18.00 ± .408 (4)	19.40 ± .510 (5)
MCHC (Z)		34.67 ± .882 (3)	35.20 ± .374 (5)		35.00 ± .408 (4)	37.00 ± .447 (5)
WBC (X 10 ³)	+	2.14 ± .302 (3)	2.48 ± .451 (5)		1.68 ± .215 (4)	5.74 ± 3.12 (5)
PMN (Z)		18.00 ± 5.51 (3)	47.80 ± 6.83 (5)		40.50 ± 7.80 (4)	26.80 ± 4.62 (5)
BANDS (Z)		0.00 ± 0.00 (3)	.60 ± .400 (5)	x	2.50 ± .645 (4)	1.00 ± .447 (5)
LYMPH (Z)		71.33 ± 7.13 (3)	43.60 ± 5.22 (5)	A	50.25 ± 7.16 (4)	65.00 ± 5.93 (5)
ATYP LYMPH(Z)		3.00 ± .577 (3)	.80 ± .374 (5)	* C	.75 ± .479 (4)	.60 ± .245 (5)
MONO (Z)		5.33 ± .882 (3)	3.40 ± 1.96 (5)		3.25 ± .750 (4)	5.00 ± 1.05 (5)
EOSIN (Z)		2.33 ± 1.86 (3)	2.60 ± 1.08 (5)	x	2.25 ± 1.03 (4)	1.00 ± .447 (5)
BASO (Z)		0.00 ± 0.00 (3)	.60 ± .400 (5)	x	.50 ± .289 (4)	.40 ± .245 (5)
RETICS (Z)		1.17 ± .441 (3)				2.76 ± .248 (5)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x .

TABLE 129

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 13 WEEKS OF TREATMENT

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	.10 % IN DIET
RBC (X 10 ⁶)		7.64 ± .355 (5)	7.84 ± .262 (4)		7.40 ± .262 (5)	8.47 ± 0.00 (1)
HGB (G %)		13.88 ± .619 (5)	13.73 ± .409 (4)		13.10 ± .591 (5)	15.70 ± 0.00 (1)
HCT (%)		38.60 ± 1.75 (5)	38.00 ± .707 (4)		36.20 ± 1.62 (5)	42.00 ± 0.00 (1)
MCV (U) ³		51.60 ± .678 (5)	49.75 ± 1.55 (4)		50.00 ± .633 (5)	50.00 ± 0.00 (1)
MCH (UG)		18.60 ± .245 (5)	17.75 ± .250 (4)		17.80 ± .374 (5)	19.00 ± 0.00 (1)
MCHC (%)	+	36.20 ± .200 (5)	31.25 ± 5.50 (4)		36.60 ± .748 (5)	36.00 ± 0.00 (1)
WBC (X 10 ³)		3.98 ± .585 (5)	3.00 ± .580 (4)		3.21 ± .286 (5)	1.51 ± 0.00 (1)
PMN (%)		23.00 ± 2.35 (5)	27.75 ± 3.50 (4)		18.60 ± 3.23 (5)	22.00 ± 0.00 (1)
BANDS (%)		.40 ± .245 (5)	1.00 ± .707 (4)	x	.40 ± .245 (5)	2.00 ± 0.00 (1)
LYMPH (%)		70.80 ± 2.08 (5)	66.75 ± 3.20 (4)		75.60 ± 3.31 (5)	70.00 ± 0.00 (1)
ATYP LYMPH(%)		1.60 ± .400 (5)	.50 ± .289 (4)	A	.80 ± .374 (5)	0.00 ± 0.00 (1)
MONO (%)		2.20 ± .583 (5)	2.50 ± 1.85 (4)	x	4.00 ± 1.18 (5)	3.00 ± 0.00 (1)
EOSIN (%)		1.60 ± .812 (5)	1.00 ± .707 (4)		.60 ± .400 (5)	1.00 ± 0.00 (1)
BAZO (%)		.40 ± .400 (5)	.50 ± .500 (4)	y	.80 ± .374 (5)	2.00 ± 0.00 (1)
RETICS (%)		1.52 ± .206 (5)				1.20 ± 0.00 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 130

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 % IN DIET	T R	.01 % IN DIET	T R
RBC (X 10 ⁶)		7.32 ± .297 (5)	7.26 ± .243 (3)		7.77 ± .126 (5)	4.90 ± 0.00 (1) + A
HGB (G Z)		12.86 ± .438 (5)	13.77 ± .367 (3)		13.70 ± .219 (5)	9.40 ± 0.00 (1) + A
HCT (Z)		36.60 ± .980 (5)	37.67 ± .333 (3)		38.00 ± .447 (5)	26.00 ± 0.00 (1) + A
MCV (U) ³		50.80 ± .860 (5)	53.33 ± 1.45 (3)		50.00 ± 0.00 (5)	55.00 ± 0.00 (1)
MCH (UNG)		17.80 ± .200 (5)	19.00 ± .577 (3)		17.60 ± .245 (5)	18.00 ± 0.00 (1)
MCHC (Z)		34.80 ± .490 (5)	36.00 ± 1.53 (3)		35.80 ± .374 (5)	35.00 ± 0.00 (1)
WBC (X 10 ³)		4.70 ± 1.02 (5)	7.73 ± .835 (3)		3.98 ± .842 (5)	6.00 ± 0.00 (1)
PHN (Z)	*	19.40 ± 1.83 (5)	32.33 ± 6.17 (3)		18.20 ± .663 (5)	19.00 ± 0.00 (1)
BANDS (Z)		0.00 ± 0.00 (5)	.33 ± .333 (3)	x	0.00 ± 0.00 (5)	0.00 ± 0.00 (1) x
LYMPH (Z)	*	70.60 ± 1.63 (5)	60.33 ± 6.89 (3)		74.40 ± .510 (5)	74.00 ± 0.00 (1)
ATYP LYMPH(Z)		1.60 ± 1.57 (5)	2.33 ± 1.45 (3)		2.60 ± .400 (5)	2.00 ± 0.00 (1)
MONO (Z)		4.40 ± .245 (5)	3.67 ± .882 (3)		3.60 ± .245 (5)	4.00 ± 0.00 (1)
EOSIN (Z)		2.00 ± .548 (5)	1.00 ± .577 (3)		1.20 ± .200 (5)	1.00 ± 0.00 (1)
BASO (Z)		0.00 ± 0.00 (5)	0.00 ± 0.00 (3)		0.00 ± 0.00 (5)	0.00 ± 0.00 (1)
RETICS (Z)		2.86 ± .854 (5)				1.50 ± 0.00 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST ; CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 131

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			.001 Z IN DIET	T R	.01 Z IN DIET	.10 Z IN DIET
RBC (X 10 ⁶)		7.00 ± .218 (3)	7.26 ± .156 (3)		7.21 ± .100 (2)	7.00 ± .565 (2)
HGB (G %)		12.70 ± .802 (3)	13.40 ± .100 (3)		13.00 ± .200 (2)	12.35 ± 1.35 (2)
HCT (Z)		35.00 ± 1.15 (3)	36.67 ± .882 (3)		37.00 ± 0.00 (2)	35.00 ± 3.00 (2)
MCV (U) ³		51.00 ± .577 (3)	51.67 ± .333 (3)		52.50 ± 1.50 (2)	51.50 ± .500 (2)
MCH (UUG)		18.33 ± .333 (3)	18.67 ± .333 (3)		18.00 ± 0.00 (2)	17.50 ± .500 (2)
MCHC (Z)		36.00 ± 1.15 (3)	35.67 ± .667 (3)		35.00 ± 0.00 (2)	35.50 ± 1.50 (2)
WBC (X 10 ³)		5.13 ± .498 (3)	5.13 ± .722 (3)		2.55 ± .050 (2)	5.15 ± .850 (2)
PMN (Z)		17.67 ± 1.20 (3)	17.33 ± 1.33 (3)		15.50 ± .500 (2)	12.50 ± .500 (2)
BANDS (Z)		0.00 ± 0.00 (3)	0.00 ± 0.00 (3)		0.00 ± 0.00 (2)	0.00 ± 0.00 (2)
LYMPH (Z)		73.67 ± 1.86 (3)	77.00 ± 1.53 (3)		77.50 ± 2.50 (2)	79.00 ± 1.00 (2)
ATYP LYMPH(Z)		4.00 ± 0.00 (3)	.67 ± .667 (3)	B	2.00 ± 2.00 (2)	4.50 ± .500 (2)
MONO (Z)		4.00 ± 0.00 (3)	4.00 ± 0.00 (3)		4.00 ± 0.00 (2)	3.50 ± .500 (2)
EOSIN (Z)		.67 ± .667 (3)	.67 ± .667 (3)	x	1.00 ± 0.00 (2)	.50 ± .500 (2)
BASO (Z)		0.00 ± 0.00 (3)	.33 ± .333 (3)	x	0.00 ± 0.00 (2)	0.00 ± 0.00 (2)
RETICS (Z)		1.83 ± .219 (3)				1.00 ± 0.00 (2)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 Z - A,
20 Z - B, 35 Z - C, 50 Z - D. RATIO TEST CANNOT BE CALCULATED - x.

TABLE 132

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS			
			T R	.01 % IN DIET	.10 % IN DIET	T R
RBC (X 10 ⁶)		7.58 ± .284 (5)		7.50 ± .137 (4)	7.18 ± .569 (3)	5.44 ± 1.20 (2)
HGB (G Z)	*	13.50 ± .414 (5)		13.25 ± .189 (4)	12.87 ± 1.11 (3)	10.10 ± 2.50 (2)
HCT (Z)		38.80 ± 1.39 (5)		37.50 ± .866 (4)	36.00 ± 2.65 (3)	28.50 ± 7.50 (2)
MCV (U) ³		52.00 ± .894 (5)		50.25 ± .854 (4)	50.67 ± .333 (3)	53.00 ± 2.00 (2)
MCH (UUG)		18.00 ± .447 (5)		18.00 ± .408 (4)	18.00 ± .577 (3)	19.50 ± .500 (2)
MCHC (Z)		34.60 ± 1.08 (5)		36.00 ± .707 (4)	36.33 ± .882 (3)	37.00 ± 1.00 (2)
WBC (X 10 ³)		5.50 ± .612 (5)		4.67 ± .740 (4)	5.55 ± 1.20 (3)	3.28 ± .380 (2)
PMN (Z)		18.60 ± 4.01 (5)		32.50 ± 4.73 (4)	37.00 ± 9.45 (3)	15.50 ± 7.50 (2)
BANDS (Z)	*	0.00 ± 0.00 (5)		.25 ± .250 (4)	.33 ± .333 (3)	3.00 ± 3.00 (2)
LYMPH (Z)		75.40 ± 4.00 (5)		59.75 ± 4.07 (4)	58.00 ± 9.29 (3)	77.00 ± 13.0 (2)
ATYP LYMPH(Z)		2.80 ± .735 (5)		2.75 ± .479 (4)	2.67 ± .333 (3)	1.00 ± 1.00 (2)
MONO (Z)		1.20 ± .583 (5)		1.50 ± .645 (4)	.33 ± .333 (3)	1.00 ± 1.00 (2)
EOSIN (Z)		2.20 ± .860 (5)		3.25 ± .854 (4)	1.67 ± .333 (3)	2.50 ± 2.50 (2)
BASO (Z)		0.00 ± 0.00 (5)		0.00 ± 0.00 (4)	0.00 ± 0.00 (3)	0.00 ± 0.00 (2)
RETICS (Z)	*	1.40 ± .945 (5)				5.00 ± 0.00 (1)

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - X.

TABLE 133

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 13 WEEKS OF TREATMENT AND 4 WEEKS OF RECOVERY

DEPENDENT VARIABLE	B C	CONTROL GROUP	TREATMENT GROUPS					
			.001 % IN DIET		.01 % IN DIET		.10 % IN DIET	
			T	R	T	R	T	R
RBC (X 10 ⁶)		7.88 ± .447 (4)	8.19 ± .366 (5)		6.81 ± .664 (4)		7.95 ± .242 (5)	
HGB (G %)		14.07 ± .879 (4)	14.72 ± .676 (5)		12.45 ± 1.23 (4)		14.48 ± .360 (5)	
HCT (Z)	*	40.25 ± 2.50 (4)	41.80 ± 1.32 (5)		34.25 ± 4.09 (4)		39.80 ± .735 (5)	
MCV (U) ³		51.75 ± .750 (4)	51.60 ± .927 (5)		50.50 ± 1.19 (4)		51.20 ± .970 (5)	
MCH (UUG)		17.50 ± .289 (4)	18.00 ± .316 (5)		18.00 ± 0.00 (4)		18.40 ± .400 (5)	
MCHC (Z)		34.75 ± .479 (4)	35.20 ± .860 (5)		36.00 ± 1.08 (4)		37.00 ± 0.00 (5)	
WBC (X 10 ³)		5.23 ± .952 (4)	3.34 ± .477 (5)		3.69 ± 1.80 (4)		6.88 ± .903 (5)	
PHN (Z)		14.50 ± 4.84 (4)	31.00 ± 5.61 (4)		25.00 ± 3.03 (4)		16.50 ± 4.25 (4)	
BANDS (Z)		.50 ± .289 (4)	.25 ± .250 (4)		0.00 ± 0.00 (4)	A	0.00 ± 0.00 (4)	A
LYMPH (Z)		76.75 ± 5.02 (4)	62.75 ± 7.00 (4)		71.00 ± 4.32 (4)		78.25 ± 4.87 (4)	
ATYP LYMPH(Z)		3.50 ± .957 (4)	2.75 ± .479 (4)		1.25 ± .479 (4)	B	4.50 ± .500 (4)	
MONO (Z)		.50 ± .289 (4)	0.00 ± 0.00 (4)	x	.50 ± .500 (4)	x	0.00 ± 0.00 (4)	x
EOSIN (Z)		4.25 ± 1.03 (4)	3.25 ± 1.93 (4)		2.00 ± 1.35 (4)		1.00 ± .707 (4)	
BASO (Z)		0.00 ± 0.00 (4)	0.00 ± 0.00 (4)		0.00 ± 0.00 (4)		0.00 ± 0.00 (4)	
RETICS (Z)	*	2.45 ± 1.21 (4)					1.16 ± .204 (5)	x

ENTRIES ARE MEANS AND STANDARD ERRORS WITH GROUP N IN PARENTHESES

* CONFIDENCE LEVEL = .95

+ CONFIDENCE LEVEL = .99

BC = BARTLETT'S CHI-SQUARE ; T = TREATMENT-CONTROL CONTRAST

R = TREATMENT-CONTROL RATIO TEST : CONFIDENCE INTERVAL GREATER OR LOWER THAN CONTROL MEAN BY AT LEAST 10 % - A,
20 % - B, 35 % - C, 50 % - D. RATIO TEST CANNOT BE CALCULATED - x.

and hematocrit were lower and MCV was slightly higher in the two males at the 0.10% treatment level than in controls. Reticulocytes were also higher in these animals. Hematological parameters for the females and for the other male treatment groups were unremarkable.

On the whole, the data suggest that a compensatory anemia occurs in mice at the 0.10% condensate blend level similar to that observed in rats. Although the failure of males at this level to recover completely from the anemia, in contrast to females, might indicate that the former are more strongly affected by treatment, the small sample size at this dose level precludes such a conclusion. There does appear to be evidence of individual susceptibility to the treatment--e.g., the anemic trend in the recovery males (Tables 130 and 132) in contrast to those killed directly following treatment (Tables 126 and 128). Although it is difficult to say with certainty that anemia is absent at the 0.01% level, it is clearly so at the 0.001% level in both males and females at every sacrifice.

Histopathology

Microscopic lesions found in mice treated for 4 weeks with condensate blend are presented in Tables 134 and 135. All five males at the highest dose level had testicular atrophy with slight-to-moderate cellular debris and aspermia of the epididymis and hemosiderosis of the spleen. Females at this level also had hemosiderosis of the spleen. The absence of these effects at lower dose levels and in controls indicates that they are probably treatment-related. Three of the five females at the 0.10% level also had acute endometritis, accompanied in one case by endometrial hyperplasia and in the other two by acute vaginitis and cervicitis. The lesions occurred more frequently in the high-dose females than in any other female group and may, therefore, be treatment-related.

Male mice treated for 13 weeks at the 0.10% level (Table 136) also had testicular atrophy accompanied by atrophy of or cellular debris in the epididymi of four of these mice; four of them also exhibited hemosiderosis of the spleen. Four of five females at the highest two doses, three at the 0.001% level, and two control females had hemosiderosis of the spleen (Table 137). No lesions were found in tissues from the uteri of treated females. The alterations observed in the testes and spleen are probably treatment-related. Other lesions were noted occasionally, but with no apparent dose relationship discernible in the data.

Mice treated for 4 weeks with an additional 4 weeks for recovery had an increase in the incidence of hemosiderosis of the spleen at the 0.01 and 0.10% condensate blend levels compared with controls (Tables 138 and 139). There were also several cases of lymphocytic foci in the kidneys and liver among treated mice, but these were not

Table 134

MICROSCOPIC LESIONS IN MALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Epididymis					
Aspermia				376, 377, 378	
				379, 380	
Lungs					
Moderate focal alveolar distension; focal bronchopneumonia; chronic respiratory disease				380	
Slight focal alveolar dilations; collapse and chronic respiratory disease	316				
Chronic respiratory disease; solitary focal hemorrhage; focal bronchopneumonia				377, 378	
Chronic respiratory disease		339			
Focal bronchopneumonia			348		
Alveogenic tumor		340			
Salivary glands					
Cystic hypertrophy of ducts	320				
Skin					
Moderate acute focal dermatitis			350		
Spleen					
Hemosiderosis				376, 377, 378	
				379, 380	
Testes					
Atrophy with cell debris slight or moderate				376, 377, 378	
				379, 380	

Table 135

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Eye					
Absence of rods and cones		438			
Kidneys					
Lymphocytic foci	417				
Liver					
Triaditis, solitary focus moderate			457		
Lymphocytic foci, paravascular				476	
Lungs					
Slight focal alveolar dilation and collapse	416				
Chronic respiratory disease; slight focal alveolar dilation and collapse	417			476,479	
Chronic respiratory disease; focal bronchopneumonia and slight focal alveolar dilation and collapse			457,460		
Chronic respiratory disease		437,439	456	480	
Focal bronchopneumonia				477	
Bronchopneumonia, focal; chronic respiratory disease	418				
Spleen					
Hemosiderosis				476,477,478	
				479,480	
Uterus					
Endometrial hyperplasia			460		
Endometrial hyperplasia and acute endometritis				479	
Acute endometritis				477,478	
Subacute endometritis	419				

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT

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Table 136

MICROSCOPIC LESIONS IN MALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet				
	0	.001%	.01%	.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Adrenal - Fibrosis of cortex					369
Epididymis					
Cell Debris					366, 368, 369
Atrophy					370
Kidney					
Lymphocytic foci	308, 310	326, 327	359		367
Fibrosis of cortex		329			
Liver - lymphocytic foci	306				368
Lungs					
Chronic respiratory disease		326, 327			369
Alveolar dilation, focal	309				
Alveolar dilation and collapse, focal	307				
Chronic respiratory disease and alveolar dilation, focal	310				
Chronic respiratory disease and alveolar dilation and collapse, focal	308				
Chronic respiratory disease and alveolar dilation, focal; edema, slight focal		328			
Chronic respiratory disease and hemorrhage, slight focal			359		368
Alveolar dilation, focal; congestion, slight focal; hemorrhage, slight focal			360		
Congestion, slight focal, hemorrhage					36

MICROSCOPIC LESIONS IN MALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

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Table 137

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

Organ/Lesion	Dose Level in Diet			
	0	.001%	.01%	.10%
	Group Designation			
	C0	C1	C2	C3
Animal Number				
Adrenal - Fibrosis of cortex			448	
Cervix - Acute inflammation	409			
Kidney - Lymphocytic foci	407, 410	428, 429, 430	446, 448	467
Liver				
Lymphocytic foci	406, 408	426	447, 448, 449	466, 467, 469
Lymphocytic foci and necrosis, slight focal	410			468
Necrosis, slight focal		427		
Lungs				
Chronic respiratory disease	409	429	447, 449, 450	468
Chronic respiratory disease and alveolar dilation, focal	410			
Chronic respiratory disease and alveolar histiocytosis, slight focal	408			
Chronic respiratory disease and slight focal hemorrhage			446	
Chronic respiratory disease and slight focal congestion			448	
Alveolar dilation and collapse, focal; slight focal congestion and slight focal hemorrhage		428		
Alveolar dilation, focal; and slight focal congestion				469
Alveolar dilation and collapse, focal				466

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT

[illegible]

Table 138

MICROSCOPIC LESIONS IN MALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.1%	1.0%
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Epididymis					
Aspermia		335			
Cell debris present					373
Heart					
Calcification (myocardium), slight focal					275
Kidney					
Lymphocytes, slight focal	312, 313, 314	332, 333, 334	352, 354	373	
	315				
Liver					
Necrosis, solitary slight		333	351		
Lymphocytes, focal			354	375	
Necrosis, slight solitary; lymphocytes, focal			355		
Lung					
Chronic respiratory disease	315	333	351		
Alveolar collapse, focal	313				
Alveolar collapse and distension, focal	312			373	
Alveolar collapse and distension, focal; chronic respiratory disease			352		
Alveolar distension, focal; chronic respiratory disease	314				
Alveolar histiocytosis; chronic respiratory disease	311				
Congestion, slight				371	
Hemorrhage, slight focal			331, 335	354	
Hemorrhage, slight focal; chronic respiratory disease			334		

MICROSCOPIC LESIONS IN MALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT AND 4 WEEKS OF RECOVERY

[illegible]

Table 139

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet				
	0	0.001%	0.01%	0.1%	1.0%
	Group Designation				
	C0	C1	C2	C3	
Animal Number					
Cervix/Vagina					
Cervicitis and vaginitis, acute	411, 414, 415	432	451, 452	471, 473	
Eye					
Absence of cones and rods	411				
Kidney					
Lymphocytes, slight focal	411	432	451, 452, 455	473, 474	
Liver					
Lymphocytes, focal		431, 433, 434	452	474, 475	
Lung					
Chronic respiratory disease	413	432, 434	451	475	
Alveolar distension and collapse, focal				471	
Alveolar collapse, focal; hemorrhage			454		
Alveolar distension, focal; chronic					
respiratory disease				472	
Alveolar collapse and distension; chronic					
respiratory disease; hemorrhage, slight					
focal	415		455		
Alveolar collapse and distension; chronic					
respiratory disease; congestion, slight				474	
Alveolar collapse and distension; chronic					
respiratory disease; bronchopneumonia,					
solitary focal			452		
Alveolar collapse and distension;					
congestion, slight				473	
Bronchopneumonia, solitary; chronic					
respiratory disease		433			

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 4 WEEKS OF CONDENSATE WATER TREATMENT AND 4 WEEKS OF RECOVERY

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distributed among the groups in such a way as to suggest an obvious dose relationship to the treatment.

Microscopic lesions in mice treated for 13 weeks before recovery are listed in Tables 140 and 141. In mice at the 0.10% treatment level there were two cases of testicular atrophy with accompanying aspermia of the epididymis. Hemosiderosis of the spleen was found in tissues from four of the five males and from all five females. Since these effects were either absent or much less frequent in other groups (with the exception of females at the 0.01% treatment level), they are probably related to the treatment.

Discussion

Twenty male and 20 female mice per group were fed 0, 0.001, 0.01, and 0.10% condensate water in their diets for up to 13 weeks. Five of each sex were killed after 4 and 13 weeks of treatment and after 4 weeks of recovery following these treatment regimens.

At the 0.001% condensate water level, no treatment-related alterations were observed in appearance or behavior or in any test parameter that might suggest an effect of the treatment. At the 0.01% level there were marginal effects on body weights (lower) and blood (slight anemia) that may be due to the treatment. This is supported by data on body weights and some hematological parameters, which exhibit dose responses in the linear trend tests (Appendix D).

At the 0.10% condensate water level, several changes were noted in the treated mice. Compared with controls, body weights and food intake were depressed and many of the animals had testicular atrophy with aspermia or cellular debris in the epididymis, hemosiderosis of the spleen, enlarged spleens and--after the longer treatment period--possibly livers. Three of five females treated for 4 weeks had inflammation in the tubular reproductive tract that might also be treatment-related (although these effects were not observed in the females treated for 13 weeks). Rough fur, ataxia, humped backs, tilting of the head, circling, anemia, and cyanosis in males and rough fur in females were also observed at this level and appear to be toxic symptoms of condensate water poisoning.

As in the rats, mice at the high dose level had lower food efficiency (lower body weight gain per g of food consumed) throughout most of the treatment period. Both males and females were affected. The decrease in food efficiency stems either from poorer absorption or treatment-induced changes in metabolic activity. Further experiments are needed to resolve these possibilities.

MICROSCOPIC LESIONS IN MALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet			
	0	.001%	.01%	.10%
	Group Designation			
	C0	C1	C2	C3
	Animal Number			
Epididymis				
Abscess			344	
Aspermia				361, 364
Kidneys				
Lymphocytic foci in cortex	301, 302, 303	321, 322, 324	342, 343, 344	365
	304, 305	324, 325	345	
Liver				
Lymphocytic foci	302			
Necrosis, focal	303			
Lungs				
Alveolar collapse and distension				364
Alveolar collapse and distension, chronic				
respiratory disease		323		
Alveolar collapse and distension, chronic				
respiratory disease, hemorrhage			341	
Alveolar collapse, distension, and histiocytosis, chronic respiratory disease		324		362
Alveolar distension, hemorrhage, chronic				
respiratory disease			343	
Alveolar distension, hemorrhage		325		361
Alveolar distension, bronchopneumonia, chronic respiratory disease		322		
Alveolar distension, chronic respiratory				
disease			345	

MICROSCOPIC LESIONS IN MALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT AND 4 WEEKS OF RECOVERY

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Table 141

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level in Diet			
	0	.001%	.01%	.10%
	Group Designation			
	C0	C1	C2	C3
Animal Number				
Adrenals				
Fibrosis of cortex, focal	402,404,405	421,424	441,442,443	463
			445	
Fibrosis of cortex, focal; vacuolation in z. fasciculata, focal			444	
Eye				
Absence of pods and cones				461
Kidneys				
Lymphocytic foci in cortex	401,403,405	421,422,423	441,442,443	461,462,463
		424	444,445	464
Liver				
Extramedullary hematopoiesis	404			
Lymphocytic foci	405			463
Necrosis, focal	403	425	444,445	465
Lungs				
Alveolar distension, hemorrhage			443	
Alveolar distension, hemorrhage, chronic respiratory disease			445	
Alveolar collapse, hemorrhage, chronic respiratory disease				463
Alveolar collapse and distension, hemorrhage, chronic respiratory disease	405			
Alveolar collapse and distension, hemorrhage				464

Table 141 (Concluded)

MICROSCOPIC LESIONS IN FEMALE MICE AFTER 13 WEEKS OF CONDENSATE WATER TREATMENT
AND 4 WEEKS OF RECOVERY

Organ/Lesion	Dose Level In Diet				
	0	.001%	.01%	.10%	
	Group Designation				
	C0	C1	C2	C3	
	Animal Number				
Alveolar collapse and distension, chronic respiratory disease					465
Alveolar collapse and distension					461
Alveologenic tumor, chronic respiratory disease			441		
Bronchopneumonia, focal, chronic respiratory disease	402	423,424	442		
Congestion, chronic respiratory disease	404				462
Congestion, hemorrhage		425			
Hemorrhage		422	444		
Hemorrhage, chronic respiratory disease	401				
Chronic respiratory disease	403	421			
Lymph node necrosis, slight solitary focus	405				
Spleen	405	421,423,424	441,442,443	461,462,463	
Hemosiderosis, slight to moderate			444,445	464,465	
Uterus					
Endometrial hyperplasia		423			
Endometrial hyperplasia, dilated lumen			441		
Endometritis, acute	403	424,425	444		
Vagina					
Vaginitis, acute	401,403,404	424,425	444		462

A slight hepatomegaly appeared to be present in the mice sacrificed after 13 weeks of treatment at the high dose. Possible factors responsible for this were considered. Congestion, extramedullary hematopoiesis, or other signs of hepatotoxicity were absent in the livers, suggesting that the enlargement was an adaptative response to the treatment. One possibility is that the components induce microsomal enzyme activity; in this respect, 2,4-dinitrotoluene has not been identified as an enzyme inducer in past work, whereas 2,6-dinitrotoluene has.^{39,40} Another possibility is that the enlargement derives from increased synthesizing capability for protein, carbohydrate, and fatty acid necessitated by the lower food intake by these animals. The explanations are speculative but are testable experimentally.

Mice withdrawn from treatment and allowed 4 weeks of recovery had lingering signs of anemia and hemosiderosis of the spleen at sacrifice. Mice treated for 13 weeks with condensate water before recovery had, in addition to these symptoms, low body weights and testicular atrophy with aspermatogenesis, indicating that recovery from the toxic effects was more difficult after the longer treatment period.

The toxic effects produced by condensate water are similar in rats and mice. Both species exhibited depressed body weights, weight gain, and food intake; a mild compensatory anemia with reticulocytosis evident; testicular atrophy; enlarged spleens and/or livers, with hemosiderotic deposits in the former; clinical symptoms of neurological or neuromuscular dysfunction; signs of adaptation to the treatment, but incomplete reversal of toxic signs upon withdrawal from treatment, especially after long exposure to the condensate water. Deaths at the high dose level were more frequent in mice, especially males, than in rats; only one rat died. A second difference is that in mice the decrease in food consumption is not noted until Week 3, whereas in rats it is observed in Week 1.

The subacute oral toxicities of 2,4-DNT and 2,6-DNT were previously evaluated in mice.^{39,40} 2,4-DNT produced weight loss, a mild anemia, and mild aspermia (at 4 but not at 13 weeks); treated mice recovered. No behavioral anomalies were noted. 2,6-DNT produced weight loss, mild duct hyperplasia, testicular atrophy with aspermia, and extramedullary hematopoiesis. Because of a clotting problem in the samples from the 2,6-DNT mice, it was not established whether hematological parameters were altered. 2,4-DNT is less toxic to mice than rats, whereas the opposite is true with 2,6-DNT, based on acute oral LD50 determinations. These differences presumably stem from differences in absorption and/or metabolism. As noted above, 2,6-DNT induces microsomal enzymes, but 2,4-DNT apparently does not.

The effects on weight, blood parameters, and testes observed with the dinitrotoluenes were also observed with the condensate water mixture. There were, however, some differences. Clinical signs of toxicity were observed in the behavior and posture of the mice treated

with condensate water at the high dose (0.10%), a dose which is substantially lower than those at which no effects were observed with the individual components. Two possible explanations may be offered for this difference: (1) the components act synergistically in the mixture; (2) these particular toxic manifestations are caused by other components. Other differences in the present study were: the enlarged spleens and hemosiderosis in the spleen in females after 13 weeks; endometritis in several females; testicular atrophy in both 4- and 13-week treated males; and the incomplete reversal of toxic symptoms in recovering mice. Bile duct hyperplasia and extramedullary hematopoiesis were found in the studies on the dinitrotoluene components; since these two effects were mild and the dose levels used were higher than any used in the condensate mixture study, the absence of these lesions from the tissues of mice treated with the mixture is not surprising. With the possible exception of the clinical signs, which may signify a high potency of other components and deserve attention for this reason, the other differences are considered minor.

Water Quality Criteria

An objective of the present mammalian toxicology studies is to generate data which could be used to derive water quality criteria for the condensate water mixture in ambient waters. In the absence of either sufficient data from human exposure or long-term tests on the individual components from which water quality criteria for the mixture could be devised, the alternate approach of using data from toxicity studies with a mixture containing all the components in rough proportion to their presence in effluents may serve for purposes of establishing water quality criteria. This alternative is adopted here in order to calculate maximum concentrations for ambient waters which could be considered to minimize risks of adverse effects to the human populations.

For purposes of making the calculation, the approach proposed by the Environmental Protection Agency for nonstochastic effects is used.⁴⁴ The highest "no observable effects levels" for the condensate mixture in the three subacute studies that did not exceed levels producing effects were 0.50, 0.55,* and 1.16† mg/kg/day for the dog, rat, and mouse, respectively. These mean daily doses are converted into Acceptable Daily Intake (ADI) values for man by dividing by the uncertainty factor of 1000 used for situations in which human data or data

* From Tables 58 and 59.

† From Tables 116 and 117.

from long-term feeding studies is unavailable. To calculate a maximum recommended concentration of condensate water in water bodies, the equation

$$C = \text{ADI} \times 70 / (2 + 0.0187R) \quad (1)$$

is used, where C is the water concentration, 70 is an average human body weight, R is the bioconcentration factor for condensate water, 0.0187 is the (assumed) average weight of fish consumed daily (in kg), and 2 is the (assumed) daily water consumption (in liters) for an average adult (70 kg weight).

C can be calculated if R is known. Bioconcentration factors (BCFs) for 2,4-DNT, the major component in the condensate water, but not condensate water mixture itself, have been determined at 24- and 96-hour exposures in the bluegill muscle and viscera.⁴² In muscle, the edible portion of the fish, the BCF did not exceed 5. Depuration was rapid, all absorbed 2,4-DNT being excreted within 24 hours. Octanol/water partition coefficients for the condensate water components were taken from available literature data and a computer program designed from known structure-activity relationships was used to calculate the remaining coefficients.⁴³ Log P can be used alternatively for the calculation of R, using appropriate assumptions and an equation proposed by Veith et al.⁴⁴

$$\log R = 0.76 \log P - 0.23 \quad (2)$$

Log P for most of the condensate components varies from 0.385 for 3,5-dinitroaniline to 2.95 for 1,5-dimethyl-2,4-dinitrobenzene. Most values cluster around that for 2,4-DNT and 2,6-DNT, the major components, which have a log P value of 1.98, or are lower than this value. The value taken for log P in (2) is 1.93, a weighted average of all the components to the partition coefficients. Log R = 1.24 and R = 17.4. The maximum concentrations, C, from Equation (1), are then 15.1, 16.6, and 34.9 µg/liter (ppb) from the dog, rat, and mouse data, respectively. Thus, there is about a slightly more than two-fold range among the calculated water concentrations for condensate water, depending on the species used as a reference. It should be noted that this range is substantially above water quality criteria levels (0.45 to 1.2 µg/liter) recently estimated for 2,4-DNT, which comprises 44% by weight of the mixture.⁴⁵ The latter were derived from data on carcinogenicity studies in rodents, which data take precedence over that derived from nononcogenic studies for establishing water quality criteria.⁴⁴ These much lower values for 2,4-DNT suggest that the water quality criterion ultimately established for this component may be a determining factor in establishing similar criteria for the mixture.

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Appendix A
ACUTE ORAL LD50 CALCULATIONS

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ACUTE ORAL LD50 CALCULATIONS

Introduction

A computer program has been designed to determine the mid-lethal or mid-effective dose (LD50 or ED50) from a series of doses and quantal responses using the maximum likelihood method as described by Finney.* It calculates the response as a function (linear, natural log, or some specified power) of the dose, estimates the best straight line through these points, and then adjusts this straight line in an iterative process until the likelihood that this line is the correct regression line is at a maximum. Once this is done, the LD50 or ED50 and its percent and standard errors are calculated; the slope of the regression line and its percent and standard errors are calculated; the chi-square statistic, the degrees of freedom, and the probability that the data points fit the regression line poorly are determined; and finally, Finney's G factor and the upper and lower 95% confidence limits for the LD50 or ED50 are found.

Methods and Formulas Used

The maximum likelihood method of Finney,* which may be used for quantal dose-response relationships, involves an iterative process for solving the equation $\frac{\partial L}{\partial \phi} = 0$, where $L = \sum r_i \log P_i + \sum (n_i - r_i) \log (1 - P_i)$, n_i = sample at a particular dose, r_i = number that respond to that dose, P_i = probability that r_i respond at that dose, and ϕ = any argument of P such that P is differentiable everywhere. This method is general whatever the form of the probability distribution P , but, in particular, we are interested in the form

$$P = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^x e^{\left(\frac{-(x-\mu)^2}{2\sigma^2}\right)} dx ,$$

where x is a linear, logarithmic, or other suitable function of the dose. We can measure this probability on a transformed scale (the Normal Equivalent Deviate or Y scale) by defining

* D. J. Finney. Probit Analysis. Cambridge University Press, England, 1971.

$$P = \frac{1}{2\sqrt{\pi}} \int_{-\infty}^Y e^{\left(\frac{-u^2}{2}\right)} du$$

This is equivalent to a linear dependence of Y on x : $Y = \alpha + \beta x$, where $\mu = \frac{-\alpha}{\beta}$ and $\sigma = \frac{1}{\beta}$. Now define

$$Z = \frac{\partial P}{\partial Y} = \frac{1}{2\sqrt{\pi}} e^{\left(\frac{-Y^2}{2}\right)}.$$

Then define

$$\frac{\partial P}{\partial \alpha} = Z \text{ and } \frac{\partial P}{\partial \beta} = Zx.$$

If we guess a solution of $\frac{\partial L}{\partial \phi} = 0$ in terms of the parameters $Y_1 = a_1 + b_1 x$ (using the formula giving the line of best fit through a set of n points) $(x_1, Y_1), (x_2, y_2), \dots, (x_n, y_n)$: $y = mx + (\bar{y} - m\bar{x})$,

$$\bar{x} = \frac{\sum x_i}{n}; \bar{y} = \frac{\sum y_i}{n}; m = \frac{\sum x_i y_i - n\bar{x}\bar{y}}{(\sum x_i^2 - n\bar{x}^2)^{1/2}}, *$$

then introduce a weighting coefficient $w = \frac{Z^2}{P(1-P)}$ and a working probit

$$y = Y_1 + \frac{P-P}{Z} \quad (p \text{ being the empirical probability, i.e., } p = \frac{r_i}{n_i}), \text{ we}$$

can solve for the correction factors δa and δb using

$$(a_1 + \delta a) \sum n_i w_i + (b_1 + \delta b) \sum n_i w_i x_i = \sum n_i w_i y_i \text{ and } (a_1 + \delta a) \sum n_i w_i x_i + (b_1 + \delta b) \sum n_i w_i x_i^2$$

$$= \sum n_i w_i x_i y_i. \text{ By letting } \bar{x} = \frac{\sum n_i w_i x_i}{\sum n_i w_i} \text{ and } \bar{y} = \frac{\sum n_i w_i y_i}{\sum n_i w_i},$$

we can calculate

* S. M. Selby. Standard Mathematical Tables. The Chemical Rubber Company, Cleveland, Ohio, 1967.

$$b_2 = b_1 + \delta b = \frac{\sum n_i w_i (x_i - \bar{x})(y_i - \bar{y})}{\sum n_i w_i (x_i - \bar{x})^2}$$

and $a_2 = a_1 + \delta a = \bar{y} - b_2 \bar{x}$. We can iterate this procedure for any desired accuracy; we choose to iterate until $\delta b < .001(b_1)$.

Then we determine:

the LD50: the dose such that $0 = Y - \alpha + \beta x$, i.e., $LD50 = \frac{-\alpha}{\beta}$;

the Standard Error of the LD50: $SE(LD50) = \frac{1}{b^2} \left(\frac{1}{\sum n_i w_i} + \frac{LD50 - \bar{x}}{\sum n_i w_i (x_i - \bar{x})^2} \right)$;

the slope of the regression line: slope = β ;

the Standard Error of this slope: $SE(\text{slope}) = \frac{1}{\sum n_i w_i (x_i - \bar{x})^2}$;

the number of degrees of freedom: $k = \text{number of doses} - 2$;

the Chi-Square statistic: $\chi^2 = \sum n_i w_i (y_i - Y_i)^2$;

The probability of poor fit: found by integrating

$$F(\chi^2) = \int_0^{\chi^2} \frac{1}{2^{\frac{k}{2}} \Gamma(\frac{k}{2})} x^{\frac{(n-2)}{2}} e^{-\frac{x}{2}} dx \text{ according to Simpson's rule;}$$

$$\text{Finney's "G" factor: } G = \frac{t(.95)}{\beta^2 (\sum n_i w_i x_i^2 - (\sum n_i w_i) \bar{x}^2)} ;$$

and the upper and lower 95% confidence limits:

$$C. L. = LD50 + \frac{G}{1-G} (LD50 - \bar{x}) \pm \frac{t(.95)}{\beta(1-G)} \left(\frac{1-G}{\sum n_i w_i} + \frac{(LD50 - \bar{x})^2}{\sum n_i w_i x_i^2 - (\sum n_i w_i) \bar{x}^2} \right) .$$

Appendix B

DATA ON INDIVIDUAL ASSAYS - MUTAGENICITY TESTING

Table B-1
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		23	14	17	122
	+		15	9	17	109
Positive controls						
	-	1.0	412			654
	-	100		2068		
	-	10			1463	
9-Aminoacridine	-	2.5	482	208	957	2539
	+					
2-Nitrofluorene	-					
	+					
2-Anthramine	-					
	+					
2,3-Dinitrotoluene	-	100	16	11	13	126
	-	200	15	12	12	150
	-	300	19	12	29	165
	-	400	15	13	16	177
	-	500	9	4	31	215
	-	600	9	9	31	283
	+	500	7	9	15	139
	+	600	15	6	12	149
	+	700	9	5	13	201
	+	800	14	7	14	207
	+	900	12	13	5	200
	+	1000	6	8	19	223

Table B-2
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TAL535	TAL537	TAL538	TA98	TAL100
Negative control	-		9	6	14	29	113
	+		4	4	13	27	100
Positive controls							
8-Propiolactone	-	10	167				
9-Aminoacridine	-	100		1077			
2-Nitrofluorene	-	10			953		
AF2	-	0.1				322	957
2-Anthramine	-	2.5		11	13	26	135
	+	2.5		77	993	716	976
2,3-Dinitrotoluene	-	100	13	10	42	61	176
	-	200	13	11	44	78	216
	-	300	13	7	89	112	302
	-	500	13	9	101	172	459
	-	750	0	20	37	128	157
	-	1000	0	2	6	21	0
	+	250	4	4	30	39	128
	+	500	4	8	20	49	159
	+	750	12	10	20	46	260
	+	1000	6	5	23	35	252
	+	1500	0	1	0	5	8
	+	2000	0	0	0	0	0

Table B-3
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		29	12	10	30 127
	+		15	12	24	48 138
Positive controls						
β-Propiolactone	-	10	149	812		
9-Aminoacridine	-	100			1345	
2-Nitrofluorene	-	10				
AF2	-	0.1				259 938
2-Anthramine	-	2.5	34	14	8	44 139
	+	2.5	100	46	350	375 742
2,4-Dinitrotoluene	-	10	20	10	6	40 145
	-	50	26	16	21	43 206
	-	100	24	11	12	45 146
	-	500	17	10	22	38 236
	-	1000	8	9	24	28 360
	-	5000	0	0	0	0 0
	+	10	20	8	24	45 102
	+	50	16	9	24	37 147
	+	100	13	11	17	39 192
	+	500	14	17	16	43 258
	+	1000	16	5	27	42 390
	+	5000	0	0	16	12 0

Table B-4
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TAL535	TAL537	TAL538	TA100
Negative control	-		9	6	14	113
	+		4	4	13	100
Positive controls						
β-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100			953	
2-Nitrofluorene	-	10				957
AF2	-	0.1				135
2-Anthramine	-	2.5	26	11	13	716
	+	2.5	31	77	993	976
2,4-Dinitrotoluene	-	500	4	6	6	220
	-	750	10	12	17	327
	-	1000	4	0	11	361
	-	1500	4	1	7	227
	-	2000	0	0	2	49
	-	2500	0	0	0	0
	+	500	2	2	20	156
	+	750	8	2	9	264
	+	1000	8	7	5	265
	+	1500	22	2	4	333
	+	2000	6	1	0	31
	+	2500	1	0	0	34

Table B-5
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		29	12	10	30
	+		15	12	24	48
Positive controls						
β-Propiolactone	-	10	149	812		
9-Aminoacridine	-	100			1345	
2-Nitrofluorene	-	10				
AF2	-	0.1				938
2-Anthramine	-	2.5	34	14	8	44
	+	2.5	100	46	350	375
2,5-Dinitrotoluene	-	10	21	6	13	51
	-	50	42	6	28	38
	-	100	25	11	57	68
	-	500	0	10	0	1
	-	1000	0	0	0	0
	-	5000	0	0	0	0
	+	10	20	6	25	25
	+	50	15	8	23	40
	+	100	20	8	36	47
	+	500	24	9	407	116
	+	1000	0	12	0	16
	+	5000	0	0	0	0
						166
						188
						170
						392
						0
						0

Table B-6
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
	-	10	167			113
	-	100		1077		100
	-	10			953	
	-	0.1				957
	-	2.5		11	13	135
2-Anthramine	+	2.5		77	993	976
2,5-Dinitrotoluene	-	50				151
	-	100	12	9	35	39
	-	150	20	7	53	70
	-	200	24	5	73	86
	-	250	16	8	79	130
	-	300	11	9	103	26
	-		0	6	3	0
	+	200	15	4	48	48
	+	300	10	4	37	69
	+	400	12	5	122	47
	+	500	10	4	87	23
	+	600	0	3	0	3
	+	750	0	0	0	0

Table B-7
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		29	12	10	30	127
	+		15	12	24	48	138
Positive controls							
8-Propiolactone	-	10	149				
9-Aminoacridine	-	100		812			
2-Nitrofluorene	-	10			1345		
AF2	-	0.1				259	938
2-Anthramine	-	2.5	34	14	8	44	139
	+	2.5	100	46	350	375	742
2,6-Dinitrotoluene	-	10	37	12	8	55	156
	-	50	29	10	15	42	125
	-	100	29	12	9	39	152
	-	500	34	10	15	37	203
	-	1000	35	8	26	42	288
	-	5000	2	1	3	5	34
	+	10	20	10	24	36	120
	+	50	18	7	17	77	122
	+	100	20	8	18	46	141
	+	500	8	7	22	48	175
	+	1000	22	3	28	46	241
	+	5000	0	5	10	25	69

Table B-8
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
8-Propiolactone	-	10	167			113
9-Aminoacridine	-	100		1077		100
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	135
	+	2.5	31	77	993	976
2,6-Dinitrotoluene	-	500	14	7	11	239
	-	750	6	9	16	275
	-	1000	3	8	10	265
	-	1500	3	4	10	125
	-	2000	0	5	8	24
	-	2500	0	0	0	15
	+	500	5	7	13	198
	+	750	2	2	13	261
	+	1000	1	5	3	285
	+	1500	1	2	2	242
	+	2000	0	3	5	188
	+	2500	1	0	0	84

Table B-9
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		29	12	10	30 127
	+		15	12	24	48 138
Positive controls						
β-Propiolactone	-	10	149			
9-Aminoacridine	-	100		812		
2-Nitrofluorene	-	10			1345	
AF2	-	0.1				938
2-Anthramine	-	2.5	34	14	8	259 44 139
	+	2.5	100	46	350	375 742
3,4-Dinitrotoluene	-	10	26	15	11	30 108
	-	50	23	6	10	40 118
	-	100	20	12	6	27 114
	-	500	11	2	8	19 180
	-	1000	1	1	0	0 0
	-	5000	0	0	0	0 0
	+	10	7	10	24	36 122
	+	50	12	12	21	C* 134
	+	100	10	6	29	41 131
	+	500	14	7	7	21 122
	+	1000	1	1	9	22 178
	+	5000	0	0	0	0 0

* C, contaminated.

Table B-10
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	113
	+		4	4	13	100
Positive controls						
β-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100			953	
2-Nitrofluorene	-	10				
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	135
	+	2.5	31	77	993	976
3,4-Dinitrotoluene	-	200	17	12	10	113
	-	300	20	7	10	C*
	-	400	9	5	4	136
	-	500	9	3	8	117
	-	600	4	9	4	61
	-	750	0	3	0	15
	+	800	4	2	4	101
	+	900	4	6	6	22
	+	1000	2	2	3	46
	+	1500	0	0	0	0
	+	2000	0	0	0	0
	+	2500	0	0	0	0

* C, contaminated.

Table B-11
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		12	12	11	18	124
	+		9	7	14	23	132
Positive controls							
Sodium azide	-	1.0	142				494
9-Aminoacridine	-	100		1852			
2-Nitrofluorene	-	10			1223	1043	
2-Anthramine	+	2.5	17	27	290	315	454
3,4-Dinitrotoluene	-						
	-	100	13	11	22	35	136
	-	200	19	17	14	25	119
	-	300	16	6	18	27	171
	-	400	6	5	6	24	199
	-	500	6	7	7	18	214
	+	500	6	8	8	14	143
	+	750	5	7	3	9	277
	+	1000	2	5	3	10	122
	+	1250	0	1	4	4	0
	+	1500	0	0	0	0	0

Table B-12
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		10	6	7	14	83
	+		8	5	14	23	86
Positive controls Sodium azide 9-Aminoacridine 2-Nitrofluorene 2-Anthramine	-	1.0	754				736
	-	100		1321			
	-	50			1923	2186	
	-	2.5	11	6	20	19	107
	+	2.5	265	224	1417	2249	2775
3,5-Dinitrotoluene	-	100	12	9	119	82	121
	-	300	9	16	247	189	294
	-	500	25	24	333	244	544
	-	700	13	28	372	289	881
	-	900	11	27	214	280	1019
	-	1100	8	18	75	323	376
	+	300	5	8	124	168	207
	+	500	8	11	164	285	253
	+	700	12	15	205	345	550
	+	900	18	20	221	450	734
	+	1100	6	19	328	266	861
	+	1300	10	33	536	263	1056

Table B-13
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		27	7	12	25 89
	+		8	22	18	27 96
Positive controls						
Sodium azide	-	1.0	185			290
9-Aminoacridine	-	100		12		
2-Nitrofluorene	-	10			867	796
2-Anthramine	-	2.5	17	17	16	31 100
	+	2.5	10	18	23	18 115
3,5-Dinitrotoluene						
	-	100	17	173	182	341 148
	-	300	16	341	436	501 249
	-	500	28	383	498	349 487
	-	700	19	476	391	326 606
	-	900	6	351	283	310 795
	-	1200	2	323	205	350 195
	+	100	7	42	43	77 131
	+	500	14	130	141	145 240
	+	1000	15	278	171	186 468
	+	1500	4	265	168	180 858
	+	2000	2	288	273	81 0
	+	2500	0	30	74	53 0

Table B-14

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,5-DINITROANILINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		37	8	12	34	110
	+		14	16	27	46	97
Positive controls							
Sodium azide	-	1.0	631				
9-Aminoacridine	-	100		1650			
2-Nitrofluorene	-	10			1096		
AF2	-	0.1				366	978
2-Anthramine	-	2.5	47	7	17	31	123
	+	2.5	91	53	596	643	892
3,5-Dinitroaniline	-	0.5	41	5	11	34	111
	-	1.0	28	6	26	29	97
	-	5.0	43	17	18	49	107
	-	10.0	30	12	54	80	167
	-	15.0	47	24	85	223	264
	-	20.0	60	29	117	249	269
	+	20.0	30	9	26	50	115
	+	30.0	28	24	29	30	122
	+	40.0	20	17	27	45	114
	+	50.0	27	7	33	44	136
	+	60.0	29	7	37	42	121
	+	70.0	37	8	30	37	124

Table B-15
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3,5-DINITROANILINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		43	10	15	34	144
	+		28	14	25	54	112
Positive controls							
Sodium azide	-	1.0	480	1646	1110	369	629
9-Aminoacridine	-	100				40	172
2-Nitrofluorene	-	10				1356	1786
AF2	-	0.1					
2-Anthramine	-	2.5	48	17	22		
	+	2.5	272	157	1390		
3,5-Dinitroaniline	-	5	36	C*	0	34	178
	-	10	45	20	107	311	197
	-	15	53	27	81	391	514
	-	20	59	19	167	263	494
	-	30	71	15	298	983	404
	-	40	63	3	287	489	459
	+	20	30	C	14	52	125
	+	30	35	22	24	38	157
	+	40	39	8	C	40	165
	+	50	42	17	20	37	146
	+	60	68	8	30	50	197
	+	70	72	13	22	41	163

Table B-16

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-3,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		17	6	17	21 112
	+		9	6	8	36 95
Positive controls						
Sodium azide	-	1.0	403			460
9-Aminoacridine	-	100		803		
2-Nitrofluorene	-	10			1390	1260
2-Anthramine	-	2.5	14	8	14	37 176
	+	2.5	293	35	145	2131 2285
2-Amino-3,6-dinitrotoluene	-	100	28	14	529	261 440
	-	200	23	8	656	490 783
	-	300	31	13	726	557 1127
	-	400	30	19	595	688 1446
	-	500	11	20	613	494 1527
	-	700	0	17	127	209 1291
	-	800	0	13	0	0 50
	+	300	15	5	48	332 572
	+	400	7	6	160	575 654
	+	500	12	6	294	557 377
	+	600	4	4	0	763 288
	+	700	13	7	0	891 203
	+	800	0	9	0	522 74

Table B-17

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-3,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		52	4	28	19
	+		32	4	22	26
Positive controls						
Sodium azide	-	1.0	477			
9-Aminoacridine	-	100		1003		585
2-Nitrofluorene	-	10			1736	1652
2-Anthramine	-	2.5	60	4	32	35
	+	2.5	371	273	1673	2117
2-Amino-3,6-dinitrotoluene	-	100	37	11	454	286
	-	200	62	14	576	465
	-	300	67	19	642	577
	-	400	52	9	465	789
	-	500	62	20	247	763
	-	700	22	3	0	0
	-	800	14	5	0	359
	+	300	53	8	63	1025
	+	400	42	2	73	0
	+	500	36	4	152	811
	+	600	59	0	141	1042
	+	700	12	4	80	413
	+	800	2	0	208	330
						94

Table B-18

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-4,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		29	12	10	30 127
	+		15	12	24	48 138
Positive controls						
2-Propiolactone	-	10	149	812		
9-Aminoacridine	-	100			1345	
2-Nitrofluorene	-	10				
AF2	-	0.1				938
2-Anthramine	-	2.5	34	14	8	44 139
	+	2.5	100	46	350	375 742
2-Amino-4,6-dinitrotoluene	-	10	24	21	21	37 122
	-	50	19	8	11	36 143
	-	100	39	16	16	40 160
	-	500	16	33	61	223 469
	-	1000	44	39	172	501 650
	-	5090	12	2	24	3 41
	+	10	16	5	25	51 115
	+	50	22	9	25	50 140
	+	100	12	11	23	47 152
	+	500	29	4	29	40 280
	+	1000	21	14	55	84 584
	+	5000	20	7	9	200 300

Table B-19

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-4,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		9	6	14	29	113
	+		4	4	13	27	100
Positive controls							
8-Propiolactone	-	10	167	1077			
9-Aminoacridine	-	100			953		957
2-Nitrofluorene	-	10					
AF2	-	0.1				322	135
2-Anthramine	-	2.5	26	11	13	26	976
	+	2.5	31	77	993	716	
2-Amino-4,6-dinitrotoluene	-	250	24	35	104	137	428
	-	500	27	28	159	492	778
	-	750	20	39	254	780	884
	-	1000	16	36	274	533	478
	-	1500	7	48	69	628	279
	-	2000	10	20	30	5	167
	+	500	17	26	66	86	273
	+	750	9	12	63	94	293
	+	1000	12	24	48	176	430
	+	2000	2	3	30	100	575
	+	3000	2	0	0	0	100
	+	4000	0	0	0	0	20

Table B-20

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-AMINO-2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		37	8	12	34
	+		14	16	27	46
Positive controls	-	1.0	631			
	-	100		1650		
	-	10			1096	
	-	0.1				978
	-	2.5	47	7	17	123
	+	2.5	91	53	596	892
3-Amino-2,4-dinitrotoluene	-	100	48	11	22	29
	-	250	52	5	31	46
	-	500	60	13	50	56
	-	750	50	12	35	68
	-	1000	54	21	49	94
	-	2000	18	18	63	71
	+	100	27	10	28	48
	+	250	35	15	31	68
	+	500	41	12	69	94
	+	750	33	21	100	119
	+	1000	50	14	111	103
	+	2000	36	4	95	102
						246

Table B-21
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-AMINO-2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		43	10	15	34
	+		28	14	15	54
Positive controls						
Sodium azide	-	1.0	480			
9-Aminoacridine	-	100		1646		
2-Nitrofluorene	-	10			1110	
AF2	-	0.1				629
2-Anthramine	-	2.5	48	17	22	40
	+	2.5	272	157	1390	1356
						1786
3-Amino-2,4-dinitrotoluene	-	100	C*	13	31	35
	-	250	58	9	27	53
	-	500	75	8	37	62
	-	750	82	24	48	53
	-	1000	C	34	40	72
	-	2000	45	15	80	93
						300
	+	100	C	15	35	35
	+	250	61	14	39	66
	+	500	70	22	52	84
	+	750	C	27	67	77
	+	1000	62	14	80	96
	+	2000	17	3	52	130
						188
						204
						222
						321
						360
						120

* C, contaminated.

Table B-22

IN VITRO ASSAYS WITH *SALMONELLA* TYPHIMURIUM - 3-AMINO-2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		16	5	27	33	105
	+		12	7	15	26	132
Positive controls							
β-Propiolactone	-		137	1166			
9-Aminoacridine	-						
2-Nitrofluorene	-				1600		
AF2	-	0.1				170	858
2-Anthramine	-	2.5	10	11	25	44	135
	+	2.5	91	106	927	643	1429
3-Amino-2,6-dinitro-toluene	-	200	7	19	70	79	218
	-	400	18	14	123	127	303
	-	600	11	17	163	146	446
	-	800	10	18	285	144	955
	-	1000	10	17	278	141	1012
	-	2000	T*	2T	24T	78T	29T
	+	10	8	11	24	24	115
	+	50	10	9	27	32	126
	+	100	10	14	25	28	101
	+	250	12	12	48	44	138
	+	500	10	19	91	81	168
	+	750	8	20	205	147	325

* T, toxic.

Table B-23

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-AMINO-2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TAL535	TAL537	TAL538	TAL100
Negative control	-		9	6	14	113
	+		4	4	13	100
Positive controls						
β-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100				
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	135
	+	2.5	31	77	993	976
3-Amino-2,6-dinitrotoluene						
	-	10	16	5	15	107
	-	50	17	8	20	107
	-	100	14	10	39	120
	-	500	15	19	119	207
	-	1000	8	0	58	419
	-	5000	0	0	0	0
	+	10	13	1	15	91
	+	50	20	7	19	101
	+	100	6	4	26	114
	+	500	21	6	68	104
	+	1000	0	5	71	89
	+	5000	0	0	0	0

Table B-24
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		27	12	10	30	127
	+		15	12	24	48	138
Positive controls							
8-Propiolactone	-	10	149	812			
9-Aminoacridine	-	100			1345		
2-Nitrofluorene	-	10					
AF2	-	0.1				259	938
2-Anthramine	-	2.5	34	14	8	44	139
	+	2.5	100	46	350	375	742
4-Amino-2,6-dinitrotoluene	-	10	18	14	20	33	140
	-	50	21	4	15	44	155
	-	100	26	9	7	31	184
	-	500	37	7	25	42	230
	-	1000	28	3	27	71	190
	-	5000	4	2	4	18	4
	+	10	22	9	23	58	92
	+	50	22	14	36	53	180
	+	100	20	16	29	47	228
	+	500	20	7	33	66	430
	+	1000	23	10	40	75	475
	+	5000	8	2	2	61	260

Table B-25

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-2,6-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
β-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100				
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	26
	+	2.5	31	77	993	716
4-Amino-2,6-dinitrotoluene	-	100	17	14	15	38
	-	200	12	7	17	58
	-	300	14	10	21	32
	-	500	10	8	16	36
	-	750	4	3	19	35
	-	1000	2	2	16	35
	+	250	3	7	15	26
	+	500	7	7	13	32
	+	750	5	8	12	39
	+	1000	7	7	8	31
	+	1500	5	4	5	21
	+	2000	4	3	9	23
						275

Table B-26

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-3,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
8-Propiolactone	-	10	167	1077		113
9-Aminoacridine	-	100				100
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	26
	+	2.5	31	77	993	716
4-Amino-3,5-dinitrotoluene	-	10	16	6	18	22
	-	50	10	8	19	38
	-	100	10	8	56	33
	-	500	4	28	70	101
	-	1000	2	15	79	97
	-	5000	0	0	0	0
	+	10	12	4	18	25
	+	50	15	9	31	38
	+	100	6	6	22	48
	+	500	6	14	61	66
	+	1000	1	7	78	66
	+	5000	0	0	0	0
						94
						91
						107
						116
						83
						0

Table B-27

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-3,5-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		16	5	27	33 105
	+		12	7	15	26 132
Positive controls			137	1166	1600	
8-Propiolactone	-	10				
9-Aminoacridine	-	100				
2-Nitrofluorene	-	10				
AF2	-	0.1				
2-Anthramine	-	2.5	10	11	25	170 858
	+	2.5	91	106	927	44 135
						643 1429
4-Amino-3,5-dinitrotoluene	-	1	20	9	21	27 95
	-	5	19	11	29	29 113
	-	10	9	9	30	35 114
	-	50	15	16	67	81 148
	-	100	10	24	102	94 191
	-	500	9	23	197	157 114
	+	1	9	5	27	19 94
	+	5	9	7	20	41 103
	+	10	11	12	26	42 125
	+	50	11	11	42	49 156
	+	100	4	16	64	60 148
	+	500	18	14	0	95 0

Table B-28

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 5-AMINO-2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls			167	1077	953	957
8-Propiolactone	-	10				135
9-Aminoacridine	-	100				976
2-Nitrofluorene	-	10				
AF2	-	0.1	26	11	13	322
2-Anthramine	-	2.5	31	77	993	26
	+	2.5				716
5-Amino-2,4-dinitrotoluene	-	10	10	7	7	25
	-	50	7	8	25	24
	-	100	4	11	45	62
	-	500	6	20	31	56
	-	1000	4	9	0	40
	-	5000	0	0	0	0
	+	10	8	4	17	19
	+	50	12	7	25	45
	+	100	7	11	27	42
	+	500	7	10	27	51
	+	1000	8	4	10	0
	+	5000	0	0	0	0
						85
						112
						126
						133
						22
						0

Table D-29

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 5-AMINO-2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		16	5	27	33 105
	+		12	7	15	26 132
Positive controls						
8-Propiolactone	-	10	137			
9-Aminoacridine	-	100		1166	1600	
2-Nitrofluorene	-	10				
AF2	-	0.1				170 858
2-Anthramine	-	2.5	10	11	25	44 135
	+	2.5	91	106	927	643 1429
5-Amino-2,4-dinitrotoluene	-	1	17	14	15	32 130
	-	5	9	12	23	28 108
	-	10	16	13	26	34 109
	-	50	17	16	34	57 138
	-	100	25	23	50	77 187
	-	500	11	44	111	140 362
	+	1	11	15	29	38 97
	+	5	10	10	24	34 100
	+	10	14	11	31	40 124
	+	50	3	3	33	35 146
	+	100	6	15	53	52 161
	+	500	12	37	77	107 229

Table B-30

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 5-AMINO-2,4-DINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		12	12	11	18	124
	+		9	7	14	21	132
Positive control:							
Sodium azide	-	1.0	142				494
9-Aminoacridine	-	100		1852			
2-Nitrofluorene	-	10			1223	1043	
2-Anthramine	+	2.5	17	27	290	315	454
5-Amino-2,4-dinitrotoluene	-	50	18	28	241	158	164
	-	100	20	36	342	305	251
	-	250	13	79	786	583	501
	-	500	9	136	959	748	789
	-	600	16	137	848	719	822
	-	750	17	119	686	672	904
	+	50	14	17	63	61	128
	+	100	6	20	164	92	186
	+	250	5	40	307	269	414
	+	500	8	68	456	282	558
	+	600	8	66	416	258	659
	+	750	13	61	388	294	750

Table B-31

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 1,3-DINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		23	14	17	24 122
	+		15	9	17	24 109
Positive controls						
Sodium azide	-	1.0	412			654
9-Aminoacridine	-	100		2068		
2-Nitrofluorene	-	10			1463	1132
2-Anthramine	+	2.5	482	208	957	2806 2539
1,3-Dinitrobenzene						
	-	100	23	11	155	97 263
	-	200	26	13	262	374 397
	-	300	16	28	379	418 550
	-	400	17	25	520	658 723
	-	500	24	19	663	934 1012
	-	600	24	55	1078	998 695
	+	100	15	5	24	21 144
	+	200	16	2	50	95 182
	+	300	14	7	169	271 278
	+	400	28	12	323	452 250
	+	500	15	17	540	738 300
	+	600	26	17	814	925 401

Table B-32

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 1,3-DINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TAL535	TAL537	TAL538	TAL100
Negative control	-		9	6	14	113
	+		4	4	13	100
Positive controls						
β-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100			953	
2-Nitrofluorene	-	10				
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	135
	+	2.5	31	77	993	976
1,3-Dinitrobenzene						
	-	100	12	8	41	197
	-	200	12	10	129	265
	-	300	10	27	113	232
	-	500	0	9	98	65
	-	750	0	0	0	0
	-	1000	0	0	0	1
	+	250	12	6	24	130
	+	500	0	4	4	84
	+	750	0	3	20	0
	+	1000	0	0	15	0
	+	1500	0	0	0	0
	+	2000	0	0	0	0

Table B-33

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 1,3-DINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		29	12	10	30	127
	+		15	12	24	48	138
Positive controls							
8-Propiolactone	-	10	149	812	1345	259	938
9-Aminoacridine	-	100				44	139
2-Nitrofluorene	-	10				375	742
AF2	-	0.1					
2-Anthramine	-	2.5	34	14	8		
	+	2.5	100	46	350		
1,3-Dinitrobenzene	-	10	30	6	18	44	145
	-	50	22	8	60	50	160
	-	100	26	16	81	71	229
	-	500	22	11	509	406	455
	-	1000	0	4	225	67	105
	-	5000	0	0	0	0	0
	+	10	11	8	28	38	106
	+	50	13	18	20	48	147
	+	100	16	9	34	39	150
	+	500	19	17	333	430	202
	+	1000	15	78	1161	725	520
	+	5000	0	1	0	0	0

Table B-34
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 1,3,5-TRINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		9	6	14	29 113
	+		4	4	13	27 100
Positive controls						
β-Propiolactone	-	10	167	1077	953	322 957
9-Aminoacridine	-	100				26 135
2-Nitrofluorene	-	10				716 976
AF2	-	0.1				
2-Anthramine	-	2.5	26	11	13	
	+	2.5	31	77	993	
1,3,5-Trinitrobenzene	-	10	18	17	260	210 361
	-	50	22	0	271	473 843
	-	100	0	0	0	0 0
	-	500	0	0	0	0 0
	-	1000	0	0	0	0 0
	-	5000	0	0	0	0 0
	+	10	16	8	122	64 191
	+	50	9	7	161	112 353
	+	100	15	20	0	15 183
	+	500	0	0	0	0 0
	+	1000	0	0	0	0 0
	+	5000	0	0	0	0 0

Table B-35
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM 1,3,5-TRINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		16	5	27	33
	+		12	7	15	26
Positive controls 8-Propiolactone 9-Aminoacridine 2-Nitrofluorene AF2 2-Anthramine	-	10	137	1166	1600	
	-	100				858
	-	10			25	44
	-	0.1	10	11	927	643
	-	2.5	91	106		1429
	+	2.5				
1,3,5-Trinitrobenzene	-	10	18	18	184	167
	-	20	7	45	245	282
	-	30	0	74	525	404
	-	40	0	15	272	544
	-	50	0	0	0	0
	-	60	0	0	0	0
	+	20	7	8	38	55
	+	30	9	8	45	72
	+	40	4	7	60	70
	+	50	7	10	65	91
	+	60	4	13	71	200
	+	70	0	23	128	0

Table B-36

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 1,3,5-TRINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate	
			TA100	
Negative control	-		81	
	+		56	
Positive controls				
AF2	-	0.1	145	
2-Anthramine	-	2.5	62	
	+	2.5	366	
1,3,5-Trinitrobenzene	-	10	337	
	-	20	566	
	-	30	822	
	-	40	842	
	-	50	464	
	-	60	25	
	+	20	167	
	+	30	232	
	+	40	270	
	+	50	276	
	+	60	284	
	+	70	194	

Table B-37

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3,4-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		24	9	13	31	125
	+		11	15	14	43	97
Positive controls							
Sodium azide	-	1.0	412	1559			571
9-Aminoacridine	-	100			1463	1175	
2-Nitrofluorene	-	50			21	37	175
2-Anthramine	-	2.5	24	7			
	+	2.5	599	471	2161	2109	2567
2,3,4-Trinitrotoluene	-	30	30	10	12	41	175
	-	40	24	9	17	21	187
	-	50	11	15	17	45	204
	-	60	24	13	19	38	166
	-	70	14	13	19	36	192
	-	80	19	11	18	33	228
	+	50	18	19	18	34	192
	+	75	24	9	29	43	215
	+	100	16	10	26	32	263
	+	200	9	15	20	51	454
	+	300	0	1	0	0	6
	+	400	0	0	0	0	0

Table B-38
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3,4-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		67	37	27	43	179
	+		18	50	49	71	165
Positive controls							
Sodium azide	-	1.0	480				460
9-Aminoacridine	-	100		1165			
2-Nitrofluorene	-	10			1815	1414	
2-Anthramine	-	2.5	88		18	46	183
	+	2.5	161		360	388	612
2,3,4-Trinitrotoluene							
	-	50	57	27	33	57	328
	-	60	61	31	31	61	463
	-	70	71	27	20	68	381
	-	80	59	25	35	68	330
	-	90	68	27	44	106	497
	-	100	67	29	29	73	320
	+	50	53	44	62	81	307
	+	100	74	46	54	80	483
	+	150	82	40	58	98	955
	+	200	72	29	48	87	650
	+	250	119	31	62	88	682
	+	300	72	35	72	75	553

Table B-39
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3,6-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		24	9	10	31
	+		11	15	14	43
						125
						97
Positive controls						
Sodium azide	-	1.0	412			571
9-Aminoacridine	-	100		1559		
2-Nitrofluorene	-	50			1463	1175
2-Anthramine	-	2.5	24	7	21	37
	+	2.5	599	471	2161	2109
						2567
2,3,6-Trinitrotoluene	-	10	31	7	297	145
	-	20	25	11	524	209
	-	40	16	17	1139	363
	-	60	19	20	1730	785
	-	80	11	20	533	1272
	-	100	2	31	11	1385
						602
	+	50	20	14	29	72
	+	75	22	12	53	110
	+	100	13	17	55	225
	+	200	22	14	162	143
	+	300	8	12	344	264
	+	400	6	23	509	461
						946
						433
						503
						654
						696
						708
						946

Table B-40
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,3,6-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		67	37	27	43
	+		19	50	49	71
						165
Positive controls						
Sodium azide	-	1.0	480			460
9-Aminoacridine	-	100		1165		
2-Nitrofluorene	-	10			1815	1414
2-Anthramine	-	2.5	88		18	46
	+	2.5	161		360	388
						183
						612
2,3,6-Trinitrotoluene	-	10	54	34	145	99
	-	20	52	28	353	236
	-	40	47	28	630	501
	-	60	62	25	830	941
	-	80	62	44	1093	1011
	-	100	58	57	834	1178
						1062
	+	100	33	68	82	119
	+	200	31	33	159	150
	+	300	26	50	409	312
	+	400	28	31	656	606
	+	500	15	46	1395	749
	+	600	19	0	0	0

Table B-41
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4,5-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		24	9	10	31
	+		11	15	14	43
Positive controls						
Sodium azide	-	1.0	412			571
9-Aminoacridine	-	100		1559		
2-Nitrofluorene	-	50			1463	1175
2-Anthramine	-	2.5	24	7	21	37
	+	2.5	599	471	2161	2109
2,4,5-Trinitrotoluene	-	1	13	10	17	32
	-	5	25	19	49	108
	-	10	32	22	85	251
	-	20	42	43	172	384
	-	30	46	66	459	556
	-	40	40	117	628	856
	+	50	25	33	86	244
	+	75	32	56	100	284
	+	100	39	66	173	287
	+	200	0	197	683	581
	+	300	0	0	0	16
	+	400	0	0	0	0

Table B-42
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4,5-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		67	37	27	43
	+		19	50	49	71
Positive controls						
Sodium azide	-	1.0	480			460
9-Aminoacridine	-	100		1165		
2-Nitrofluorene	-	10			1815	1414
2-Anthramine	-	2.5	88		18	46
	+	2.5	161		360	388
2,4,5-Trinitrotoluene	-	20	881	482	527	61
	-	30	963	493	575	71
	-	40	830	650	581	159
	-	50	672	513	1060	89
	-	60	678	497	836	95
	-	70	706	704	103	0
						101
	+	50	493	164	274	28
	+	100	437	207	264	54
	+	150	T*	105	512	284
	+	200	T	161	822	478
	+	250	160	192	824	790
	+	300	27	152	0	0

* T, toxic.

Table B-43

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4,6-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		29	12	10	30
	+		15	12	24	48
Positive controls						
β-Propiolactone	-	10	149	812		
9-Aminoacridine	-	100			1345	
2-Nitrofluorene	-	10				
AF2	-	0.1				938
2-Anthramine	-	2.5	34	14	8	44
	+	2.5	100	46	350	375
2,4,6-Trinitrotoluene	-	10	21	8	18	41
	-	50	19	11	37	51
	-	100	21	6	63	93
	-	500	15	40	127	255
	-	1000	0	0	0	5
	-	5000	0	0	0	0
	+	10	8	13	30	50
	+	50	7	15	28	42
	+	100	13	7	23	36
	+	500	10	9	25	64
	+	1000	15	48	83	200
	+	5000	0	0	0	0
						160
						184
						216
						410
						1115
						0

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MAMMALIAN TOXICOLOGICAL EVALUATIONS OF TNT WASTEWATERS. VOLUME --ETC(U)

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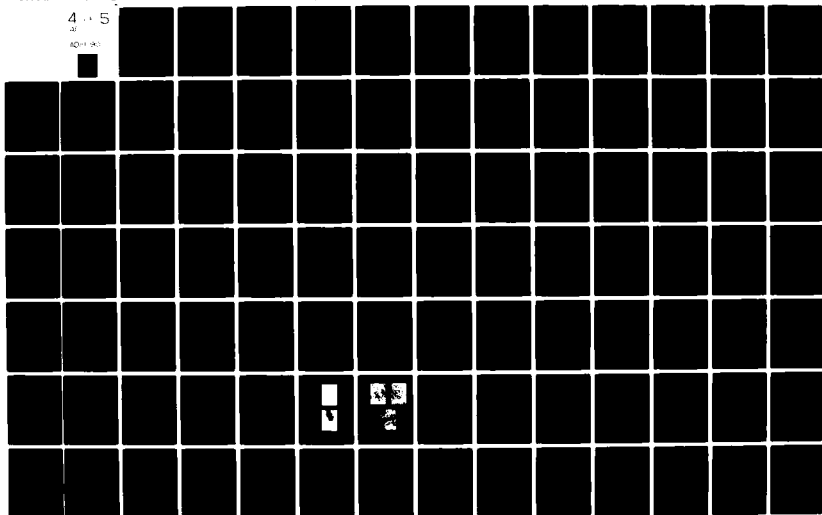


Table B-44

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2,4,6-TRINITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		12	12	11	18	124
	+		9	7	14	23	132
Positive controls							
Sodium azide	-	1.0	142				494
9-Aminoacridine	-	100		1852			
2-Nitrofluorene	-	10			1223	1043	
2-Anthramine	+	2.5			290	315	454
2,4,6-Trinitrotoluene	-	100	22	28	159	190	755
	-	200	34	42	203	305	1137
	-	300	12	69	221	262	778
	-	400	0	74	35	88	12
	-	500	0	14	1	0	0
	+	100	8	9	11	24	219
	+	250	15	22	67	82	569
	+	500	6	74	138	163	1110
	+	750	0	41	101	61	13
	+	1000	0	0	0	0	0

IN VITRO ASSAYS WITH *SALMONELLA* TYPHIMURIUM - 2,4,6-TRINITROTOLUENE

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Table B-46
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM -
1,5-DIMETHYL-2,4-DINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		29	12	10	30	127
	+		15	12	24	48	138
Positive controls							
β-Propiolactone	-	10	149				
9-Aminoacridine	-	100		812			
2-Nitrofluorene	-	10			1345		
AF2	-	0.1				259	938
2-Anthramine	-	2.5	34	14	8	44	139
	+	2.5	100	46	350	375	742
1,5-Dimethyl-2,4-dinitrobenzene	-	10	20	10	17	32	115
	-	50	20	7	13	49	130
	-	100	15	6	11	32	114
	-	500	20	4	23	33	148
	-	1000	9	3	8	12	143
	-	5000	9	1	10	7	5
	+	10	9	10	26	54	127
	+	50	20	6	28	43	142
	+	100	14	14	27	44	155
	+	500	8	2	10	38	192
	+	1000	6	2	11	34	256
	+	5000	6	2	5	20	10

Table B-47
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM -
1,5-DIMETHYL-2,4-DINITROBENZENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		23	14	17	24
	+		15	9	17	24
Positive controls			412			654
Sodium azide	-	1.0				
9-Aminoacridine	-	100		2068		
2-Nitrofluorene	-	10			1463	1132
2-Anthramine	+	2.5	482	208	957	2806
1,5-Dimethyl-2,4-dinitrobenzene	-	100	15	29	14	16
	-	250	14	8	7	33
	-	500	13	6	8	23
	-	750	13	12	13	35
	-	1000	9	15	18	17
	-	2500	7	5	0	2
	+	100	11	17	12	22
	+	250	6	9	18	33
	+	500	9	5	14	23
	+	750	8	7	13	14
	+	1000	7	6	23	12
	+	2500	6	5	3	2
						60

Table B-48
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURUM - 3-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		16	5	27	33
	+		12	8	15	26
Positive controls						
β-Propiolactone	-	10	137			
9-Aminoacridine	-	100		1166	1600	
2-Nitrofluorene	-	10				
AF2	-	1.0				858
2-Anthramine	-	2.5	10	11	25	44
	+	2.5	91	106	927	643
3-Nitrotoluene	-	10	19	12	12	30
	-	50	14	9	8	31
	-	100	9	11	11	17
	-	500	2	11	20	26
	-	1000	9	10	11	13
	-	2500	4	3	5	9
	+	10	12	8	17	14
	+	50	7	11	14	29
	+	100	8	12	17	26
	+	500	10	6	10	35
	+	1000	11	9	17	24
	+	2500	7	1	12	9

Table B-49
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	113
	+		4	4	13	100
Positive controls						
β-Propiolactone	-	10	167			
9-Aminoacridine	-	100		1077		
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	135
	+	2.5	31	77	993	976
3-Nitrotoluene	-	10	27	12	14	108
	-	50	21	7	14	110
	-	100	26	8	16	82
	-	500	20	6	22	102
	-	1000	32	7	18	107
	-	5000	37	7	9	45
	+	10	18	10	20	97
	+	50	14	15	14	100
	+	100	19	9	25	118
	+	500	20	9	17	105
	+	1000	26	8	17	101
	+	5000	1	6	12	25

Table B-50
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	166
	+		4	4	13	136
Positive controls						
8-Propiolactone	-	10	167	1077		
9-Aminoacridine	-	100			953	957
2-Nitrofluorene	-	10				
AF2	-	0.1	26	11	13	135
2-Anthramine	-	2.5	31	77	993	976
	+	2.5				
2-Nitrotoluene	-	1000	20	2	7	124
	-	2000	12	5	5	135
	-	3000	6	2	7	81
	-	4000	7	3	0	82
	-	5000	3	0	0	82
	+	1000	5	2	21	106
	+	2000	6	1	12	122
	+	3000	8	0	6	81
	+	4000	8	0	1	67
	+	5000	1	1	0	49

Table B-51
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		29	12	10	30	127
	+		15	12	24	48	138
Positive controls							
8-Propiolactone	-	10	149	812			
9-Aminoacridine	-	100			1345		938
2-Nitrofluorene	-	10					
AF2	-	0.1				259	
2-Anthramine	-	2.5	34	14	8	44	139
	+	2.5	100	46	350	375	742
2-Nitrotoluene	-	10	34	13	11	23	132
	-	50	27	13	4	42	135
	-	100	37	15	5	27	115
	-	500	25	7	9	23	117
	-	1000	29	6	5	15	124
	-	5000	2	2	0	2	35
	+	10	12	8	24	42	111
	+	50	13	13	18	30	127
	+	100	20	5	25	31	120
	+	500	20	6	17	32	128
	+	1000	20	7	15	24	111
	+	5000	5	2	7	10	64

Table B-52
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		29	12	10	30	127
	+		15	12	24	48	138
Positive controls							
β-Propiolactone	-	10	149	812			938
9-Aminoacridine	-	100				259	44
2-Nitrofluorene	-	10			1345	8	139
AF2	-	0.1				350	742
2-Anthramine	-	2.5	34	14			
	+	2.5	100	46		375	
4-Nitrotoluene	-	10	30	12	14	42	140
	-	50	25	8	14	40	124
	-	100	27	16	18	38	120
	-	500	14	7	11	31	152
	-	1000	23	6	9	42	186
	-	5000	18	5	6	20	267
	+	10	19	7	17	43	125
	+	50	13	7	19	45	118
	+	100	22	14	21	44	111
	+	500	25	6	24	25	139
	+	1000	16	2	29	35	149
	+	5000	17	5	24	43	215

Table B-53

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
β-Propiolactone	-	10	167			
9-Aminoacridine	-	100		1077		
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5		11	13	26
	+	2.5		77	993	716
4-Nitrotoluene	-	1000	22	6	10	13
	-	2000	13	5	4	18
	-	3000	7	1	6	4
	-	4000	12	8	7	17
	-	5000	0	4	1	5
	+	1000	11	7	11	20
	+	2000	3	10	15	14
	+	3000	1	6	15	11
	+	4000	7	7	5	16
	+	5000	1	1	5	1
						0
						167
						215
						213
						162
						0

Table B-54
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - TOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidien Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		9	6	14	29	113
	+		4	4	13	27	100
Positive controls							
β-Propiolactone	-	10	167				
9-Aminoacridine	-	100		1077			
2-Nitrofluorene	-	10			953		
AF2	-	0.1				322	957
2-Anthramine	-	2.5	26	11	13	26	135
	+	2.5	31	77	993	716	976
Toluene	-	1000	13	14	6	20	96
	-	2000	10	7	4	9	59
	-	3000	3	3	4	5	65
	-	4000	3	4	4	0	57
	-	5000	0	2	0	5	68
	+	1000	7	3	4	16	78
	+	2000	14	2	6	11	78
	+	3000	7	3	5	10	67
	+	4000	7	4	5	5	78
	+	5000	8	1	6	4	99

Table B-55
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - TOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		29	12	10	30
	+		15	12	24	48
Positive controls						
β-Propiolactone	-	10	149	812	1345	259
9-Aminoacridine	-	100				938
2-Nitrofluorene	-	10				44
AF2	-	0.1				375
2-Anthramine	-	2.5	34	14	8	139
	+	2.5	100	46	350	742
Toluene	-	10	20	11	19	34
	-	50	16	10	8	29
	-	100	15	7	13	32
	-	500	23	7	11	24
	-	1000	22	6	8	32
	-	5000	19	3	12	26
	+	10	13	7	19	25
	+	50	13	8	22	33
	+	100	10	9	25	16
	+	500	16	13	22	16
	+	1000	13	3	27	48
	+	5000	7	4	22	56

Table B-56

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-METHYL-2-NITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		9	6	14	29 113
	+		4	4	13	27 100
Positive controls			167	1077	953	
β-Propiolactone	-	10				
9-Aminoacridine	-	100				
2-Nitrofluorene	-	10				
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	26 135
	+	2.5	31	77	993	716 976
3-Methyl-2-nitrophenol	-	10	12	7	11	27 102
	-	50	7	8	12	20 110
	-	100	11	6	10	30 93
	-	500	6	5	12	20 105
	-	1000	8	6	10	19 104
	-	5000	0	0	0	0 0
	+	10	13	7	16	23 93
	+	50	14	8	18	27 89
	+	100	5	8	12	27 96
	+	500	9	5	10	19 78
	+	1000	4	0	5	23 74
	+	5000	0	0	0	0 0

Table B-57
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-METHYL-2-NITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		16	5	27	33
	+		12	7	15	26
Positive controls						
β-Propiolactone	-	10	137			
9-Aminoacridine	-	100		1166		
2-Nitrofluorene	-	10			1600	
AF2	-	0.1				
2-Anthramine	-	2.5	10	11	25	170
	+	2.5	91	106	927	44
						643
	-	10	14	8	11	47
	-	50	14	9	18	29
	-	100	16	10	11	20
	-	500	8	9	23	17
	-	1000	10	4	13	16
	-	2500	1	1	2	0
						8
3-Methyl-2-nitrophenol	+	10	9	7	23	16
	+	50	6	6	14	28
	+	100	5	6	18	36
	+	500	6	7	23	19
	+	1000	6	7	17	15
	+	2500	2	0	2	1
						0
						129
						109
						110
						102
						70
						0

Table B-58
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 5-METHYL-2-NITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		16	5	27	33 105
	+		12	7	15	26 132
Positive controls						
β-Propiolactone	-	10	137			
9-Aminoacridine	-	100		1166		
2-Nitrofluorene	-	10			1600	
AF2	-	0.1				170 858
2-Anthramine	-	2.5	10	11	25	44 135
	+	2.5	91	106	927	643 1429
5-Methyl-2-nitrophenol	-	1	14	8	20	35 116
	-	5	5	7	8	22 117
	-	10	18	10	17	23 116
	-	25	15	12	17	22 115
	-	50	14	2	8	20 80
	-	100	8	6	5	25 113
	+	1	10	9	11	35 113
	+	5	13	11	25	35 137
	+	10	11	4	29	31 136
	+	25	7	9	18	27 105
	+	50	6	12	18	18 108
	+	100	6	7	17	43 113

Table B-59
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 5-METHYL-2-NITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		9	6	14	29	113
	+		4	4	13	27	100
Positive controls	-	10	167	1077			
	-	100			953		
	-	10					
	-	0.1					957
	-	2.5	26	11	13	26	135
2-Anthramine	+	2.5	31	77	993	716	976
5-Methyl-2-nitrophenol	-	10	22	9	8	18	111
	-	50	37	9	23	22	111
	-	100	28	6	13	30	98
	-	500	10	7	5	17	81
	-	1000	5	3	6	5	60
	-	5000	0	0	0	0	0
	+	10	18	8	27	22	107
	+	50	15	10	16	36	90
	+	100	3	8	18	30	97
	+	500	8	5	19	14	84
	+	1000	0	1	5	2	0
	+	5000	0	0	0	0	0

Table B-60
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-METHYL-4,6-DINITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		17	6	17	21 112
	+		9	6	8	36 95
Positive controls						
Sodium azide	-	1.0	403			460
9-Aminoacridine	-	100		803		
2-Nitrofluorene	-	10			1390	1260
2-Anthramine	-	2.5	14	8	14	37 176
	+	2.5	293	35	145	2131 2285
3-Methyl-4,6-dinitrophenol	-	10	9	8	9	18 160
	-	50	15	6	17	27 83
	-	100	24	16	15	31 107
	-	500	14	47	15	57 97
	-	750	8	47	19	51 137
	-	1000	12	47	9	57 95
	+	10	9	6	29	41 102
	+	50	9	14	26	36 122
	+	100	7	12	16	37 122
	+	500	4	14	13	47 90
	+	750	3	20	9	47 89
	+	1000	2	29	6	44 55

Table B-61

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-METHYL-4,6-DINITROPHENOL

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		52	4	28	19	120
	+		32	4	22	26	95
Positive controls							
Sodium azide	-	1.0	477				585
9-Aminoacridine	-	100		1003			
2-Nitrofluorene	-	10			1736	1652	
2-Anthramine	-	2.5	60	4	32	35	122
	+	2.5	371	273	1673	2117	1932
3-Methyl-4,6-dinitrophenol	-	200	28	29	28	33	88
	-	400	37	30	14	38	108
	-	600	12	38	11	44	106
	-	800	4	30	15	57	128
	-	1000	4	24	7	48	41
	-	1200	7	9	0	47	0
	+	200	24	19	16	34	93
	+	400	21	26	9	26	91
	+	600	7	30	5	35	40
	+	800	5	12	2	25	29
	+	1000	4	0	4	25	4
	+	1200	0	0	0	1	3

Table B-62
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-4-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		9	6	14	29	113
	+		4	4	13	27	100
Positive controls							
β-Propiolactone	-	10	167				
9-Aminoacridine	-	100		1077			
2-Nitrofluorene	-	10			953		
AF2	-	0.1				322	957
2-Anthramine	-	2.5	26	11	13	26	135
	+	2.5	31	77	993	716	976
2-Amino-4-nitrotoluene	-	10	20	8	17	31	132
	-	50	25	7	21	39	113
	-	100	28	16	23	36	159
	-	500	39	18	92	76	182
	-	1000	46	18	147	150	243
	-	5000	16	15	443	107	275
	+	10	15	18	24	34	115
	+	50	12	9	30	24	117
	+	100	18	18	40	55	144
	+	500	17	7	104	88	197
	+	1000	26	23	137	117	251
	+	5000	8	42	393	162	143

Table B-63
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-4 NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		16	5	27	33
	+		12	7	15	26
Positive controls			137			105
β-Propiolactone	-	10				
9-Aminoacridine	-	100		1166	1600	
2-Nitrofluorene	-	10				
AF2	-	0.1				858
2-Anthramine	-	2.5	10	11	25	44
	+	2.5	91	106	927	643
						1429
2-Amino-4-Nitrotoluene	-	750	16	20	152	93
	-	1000	10	0	135	101
	-	2000	12	59	209	168
	-	3000	6	0	224	150
	-	4000	0	45	0	0
	-	5000	0	3	0	0
	+	500	8	16	83	72
	+	750	9	7	178	91
	+	1000	11	0	199	107
	+	2000	9	26	395	119
	+	3000	10	0	559	0
	+	4000	9	27	0	0
						214
						0

Table B-64
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-6-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		36	8	12	34 110
	+		14	16	27	46 97
Positive controls						
Sodium azide	-	1	631			
9-Aminoacridine	-	100		1650		
2-Nitrofluorene	-	10			1096	
AF2	-	0.1				
2-Anthramine	-	2.5	47	7	17	366 978
	+	2.5	91	53	596	31 123 643 892
2-Amino-6-nitrotoluene	-	200	56	11	17	29 118
	-	400	60	8	32	48 94
	-	600	38	3	25	31 145
	-	800	70	3	24	38 146
	-	1000	71	5	18	38 148
	-	2000	77	5	25	46 157
	+	200	9	9	34	47 123
	+	400	17	8	38	55 113
	+	600	16	11	37	54 118
	+	800	16	5	33	56 123
	+	1000	10	6	38	66 149
	+	2000	25	9	50	63 147

Table B-65
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 2-AMINO-6-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA98 TA100
Negative control	-		43	10	15	34 143
	+		28	14	15	53 112
Positive controls						
AF2	-	0.1				369 629
9-Aminoacridine	-	100		1646		
Sodium azide	-	1	480			
2-Nitrofluorene	-	10			1110	
2-Anthramine	-	2.5	48	17	22	40 172
	+	2.5	272	157	1390	1356 1786
2-Amino-6-nitrotoluene	-	200	51	11	14	34 146
	-	400	53	13	15	24 133
	-	600	70	14	19	41 153
	-	800	49	6	17	30 153
	-	1000	60	6	15	23 188
	-	2000	57	11	20	27 160
	+	200	35	8	22	38 C*
	+	400	27	11	35	40 C
	+	600	28	13	25	36 150
	+	800	19	14	33	45 185
	+	1000	25	15	49	57 155
	+	2000	24	15	52	66 159

* Contaminated.

Table B-66
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-AMINO-4-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TAL535	TAL537	TAL538	TAL98 TAL100
Negative control	-		17	6	17	21 112
	+		9	6	8	36 95
Positive controls						
Sodium azide	-	1.0	403			460
9-Aminoacridine	-	100		803		
2-Nitrofluorene	-	10	14	8	1390	1260 176
2-Anthramine	-	2.5	293	35	145	2131 2285
	+	2.5				
3-Amino-4-nitrotoluene	-	500	27	11	427	179 158
	-	750	27	13	510	263 171
	-	1000	25	15	671	363 249
	-	1500	35	25	878	580 405
	-	2000	12	50	986	803 622
	-	2500	18	27	872	341 243
	+	500	13	13	287	168 165
	+	750	14	15	423	304 247
	+	1000	12	22	629	372 267
	+	1500	11	22	996	787 426
	+	2000	14	38	986	1004 1011
	+	2500	10	62	1316	782 912

Table B-67

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-AMINO-4-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		52	4	28	19
	+		32	4	22	26
Positive controls						
Sodium azide	-	1.0	477			585
9-Aminoacridine	-	100		1003		
2-Nitrofluorene	-	10			1736	1652
2-Anthramine	-	2.5	60	4	32	35
	+	2.5	371	273	1673	2117
3-Amino-4-nitrotoluene	-	500	45	18	459	266
	-	750	58	16	758	493
	-	1000	45	24	872	538
	-	1500	28	49	1117	1160
	-	2000	25	63	1335	770
	-	2500	10	96	304	1555
	+	500	33	12	427	197
	+	750	42	18	536	337
	+	1000	31	22	628	429
	+	1500	23	34	1099	773
	+	2000	15	90	1405	1535
	+	2500	13	100	1020	958

Table B-68
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-2-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		16	5	27	33
	+		12	7	15	26
Positive controls						
β-Propiolactone	-	10	137			105
9-Aminoacridine	-	100		1166		132
2-Nitrofluorene	-	10			1600	
AF2	-	0.1				858
2-Anthramine	-	2.5	10	11	25	135
	+	2.5	91	106	927	1429
4-Amino-2-nitrotoluene	-	5	6	6	13	110
	-	10	6	3	9	139
	-	50	11	5	12	113
	-	100	11	10	12	124
	-	500	20	4	25	116
	-	1000	15	8	14	109
	+	5	15	6	10	95
	+	10	14	7	19	84
	+	50	10	4	16	105
	+	100	11	4	16	144
	+	500	14	1	21	134
	+	1000	13	6	34	127

Table B-69
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-AMINO-2-NITROTOLUENE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		9	6	14	29
	+		4	4	13	27
Positive controls						
β-Propiolactone	-	10	167			113
9-Aminoacridine	-	100		1077		100
2-Nitrofluorene	-	10			953	
AF2	-	0.1				957
2-Anthramine	-	2.5	26	11	13	26
	+	2.5	31	77	993	716
4-Amino-2-nitrotoluene	-	10	26	19	12	15
	-	50	20	14	13	15
	-	100	28	12	12	22
	-	500	23	7	5	22
	-	1000	30	2	12	17
	-	5000	1	0	3	1
	+	10	16	8	22	30
	+	50	20	11	15	24
	+	100	17	3	12	22
	+	500	9	4	19	24
	+	1000	15	12	31	20
	+	5000	0	0	2	0
						132
						119
						104
						119
						120
						15

Table B-70
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - MORPHOLINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		28	8	11	24
	+		13	12	14	26
Positive controls	-	1.0	593	2073		
	-	100			651	
	-	50				
	-	0.1				1043
	-	2.5	18	11	17	38
2-Nitrofluorene AF2	-	2.5	215	94	452	304
	+					427
2-Anthramine	-	10	26	8	11	14
	-	50	20	6	11	22
Morpholine	-	100	24	4	9	18
	-	500	24	6	14	19
	-	1000	20	2	9	25
	-	5000	12	5	15	24
	-					151
	-					150
	+	10	12	2	22	28
	+	50	3	8	21	26
	+	100	10	6	15	24
	+	500	13	3	26	21
	+	1000	15	5	25	30
	+	5000	18	12	22	24
	+					115
	+					157
	+					123
	+					143
	+					141
	+					191

Table B-71
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - MORPHOLINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TAL535	TAL537	TAL538	TAL100
Negative control	-		32	6	11	27
	+		11	7	34	37
Positive controls						
Sodium azide	-	1.0	420			452
9-Aminoacridine	-	100		1264		
2-Nitrofluorene	-	50			2166	1445
2-Anthramine	-	2.5	9	5	12	25
	+	2.5	274	67	502	805
Morpholine	-	1000	28	9	5	25
	-	2000	22	7	14	31
	-	3000	22	7	16	18
	-	4000	35	4	19	20
	-	5000	15	7	12	30
	-	6000	29	5	6	22
	+	1000	9	6	34	45
	+	2000	15	5	35	45
	+	3000	18	8	45	45
	+	4000	14	5	27	30
	+	5000	16	12	23	47
	+	6000	13	0	0	37

Table B-72
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - N-MORPHOLINOACETONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		60	6	18	43	78
	+		16	28	41	16	78
Positive controls	-		309				
β-Propiolactone	-	10					
9-Aminoacridine	-	100		600			
2-Nitrofluorene	-	10			1965		
AF2	-	0.1				33	98
2-Anthramine	+	2.5	30	145	1775	2800	1900
N-Morpholinoacetoneitrile	-	1	48	13	21	24	62
	-	10	62	7	13	24	112
	-	50	48	11	19	34	63
	-	100	59	13	25	20	65
	-	500	2	0	4	0	0
	-	1000	0	0	0	0	0
	-	5000	0	0	0	0	0
	+	1	13	20	21	37	80
	+	10	21	15	23	22	76
	+	50	15	16	27	26	68
	+	100	12	17	26	26	66
	+	500	3	0	3	0	0
	+	1000	0	0	0	0	0
	+	5000	0	10	1	0	0

Table B-73

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURUM - N-MORPHOLINOACETONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		21	10	8	28
	+		7	6	18	27
Positive controls						
	-	1.0	324			559
	-	100		1165		
	-	10			2008	1792
	-	2.5	16	5	11	27
2-Anthramine	+	2.5	261	93	412	881
						1019
N-Morpholinoacetoneitrile	-	50	16	7	12	22
	-	60	5	12	13	17
	-	80	9	8	7	22
	-	100	5	7	9	21
	-	120	3	6	14	29
	-	140	5	4	3	29
	-	160	6	3	11	25
	+	50	5	3	20	C*
	+	60	5	5	19	C
	+	80	6	5	15	C
	+	100	9	6	12	C
	+	120	5	8	17	C
	+	140	5	6	17	C
	+	160	4	6	13	C
						134
						107
						101
						99
						130
						124
						130

* C, contaminated.

Table B-74
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - N-NITROSOMORPHOLINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		21	10	8	C*	132
	+		7	6	18	C	133
Positive controls							
Sodium azide	-	1.0	324	1165			559
9-Aminoacridine	-	100			2008		
2-Nitrofluorene	-	50	16	5	11		
2-Anthramine	-	2.5	261	93	412		1018
	+	2.5					
N-Nitrosomorpholine							
	-	1000	19	5	16	C	145
	-	2000	24	4	14	C	176
	-	3000	15	5	19	C	153
	-	4000	20	4	9	C	149
	-	5000	23	6	16	C	134
	-	6000	26	6	13	C	157
	+	1000	58	7	20	C	291
	+	2000	210	8	13	C	323
	+	3000	198	9	20	C	461
	+	4000	238	4	25	C	460
	+	5000	273	5	23	C	381
	+	6000	207	4	32	C	330

* C, contaminated.

Table B-75

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - N-NITROSOMORPHOLINE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate			
			TA1535	TA1537	TA1538	TA100
Negative control	-		60	6	18	43
	+		16	28	41	16
Positive controls						
	-	10	309			
	-	100		600		
	-	10			1965	
	-	0.1				33
2-Nitrofluorene AF2	+	2.5	380	145	1775	2800
						98
2-Anthramine						1900
N-Nitrosomorpholine	-	1	34	3	17	17
	-	10	25	7	19	27
	-	50	27	1	19	28
	-	100	37	9	15	23
	-	500	54	3	15	32
	-	1000	95	8	23	23
	-	5000	284	14	26	34
	+	1	11	12	31	-
	+	10	15	12	27	48
	+	50	18	13	31	41
	+	100	21	15	40	42
	+	500	45	17	31	48
	+	1000	103	11	26	36
	+	5000	397	10	34	24

Table B-76
IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-NITROBENZONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TAL535	TAL537	TAL538	TA98	TAL00
Negative control	-		21	5	13	19	114
	+		9	6	18	24	91
Positive controls							
Sodium azide	-	1.0	158				189
9-Aminoacridine	-	100		1737			
2-Nitrofluorene	-	20			1820	1073	122
2-Anthramine	-	2.5	17			16	2149
	+	2.5	271			2220	
4-Nitrobenzonitrile	-	100	12	0	9	18	112
	-	250	11	2	14	21	125
	-	500	9	0	12	27	123
	-	750	12	2	1	11	78
	-	1000	0	0	0	0	32
	-	2000	0	1	0	0	0
	+	100	7	6	20	17	92
	+	250	10	4	18	15	92
	+	500	12	6	15	12	102
	+	750	6	2	1	17	149
	+	1000	3	4	9	17	101
	+	2000	0	0	0	4	0

Table B-77

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 4-NITROBENZONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate	
			TA98	TA100
Negative control	-		25	89
	+		27	96
Positive controls				
	-	10	796	
	-	1.0		290
	-	2.5		100
2-Anthramine	+	2.5		115
4-Nitrobenzonitrile	-	10	23	103
	-	50	24	99
	-	100	30	114
	-	500	25	155
	-	1000	17	183
	-	5000	0	0
	+	10	26	116
	+	50	35	98
	+	100	22	119
	+	500	15	97
	+	1000	9	132
	+	5000	0	0

Table B-78

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-NITROBENZONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate				
			TA1535	TA1537	TA1538	TA98	TA100
Negative control	-		21	5	13	19	114
	+		9	6	18	24	91
Positive controls							
Sodium azide	-	1.0	158				189
9-Aminoacridine	-	100		1737			
2-Nitrofluorene	-	20			1820	1073	
2-Anthramine	-	2.5	17			16	122
	+	2.5	271			2220	2149
3-Nitrobenzonitrile							
	-	100	17	4	22	31	176
	-	250	13	5	36	43	253
	-	500	13	6	53	61	352
	-	750	9	7	78	65	435
	-	1000	14	7	96	76	503
	-	2000	0	6	32	23	273
	+	100	5	6	19	14	165
	+	250	7	6	21	33	223
	+	500	9	7	32	50	399
	+	750	18	6	42	41	518
	+	1000	15	4	53	45	577
	+	2000	10	9	68	70	1153

Table B-79

IN VITRO ASSAYS WITH SALMONELLA TYPHIMURIUM - 3-NITROBENZONITRILE

Compound	Metabolic Activation	Micrograms of Compound Added per Plate	Histidine Revertants per Plate	
			TA98	TA100
Negative control	-		25	89
	+		27	96
Positive controls				
2-Nitrofluorene	-	10	796	290
Sodium azide	-	1.0		100
2-Anthramine	-	2.5		115
	+	2.5		
3-Nitrobenzonitrile	-	10	21	101
	-	50	32	121
	-	100	34	172
	-	500	81	323
	-	1000	118	413
	-	5000	0	0
	+	10	39	109
	+	50	31	127
	+	100	26	139
	+	500	36	305
	+	1000	53	441
	+	5000	0	0

Appendix C
MEDICAL RECORDS ON DOGS

Medical records are kept on all dogs used in toxicity studies. A copy of the vaccination program followed at Marshall Research Animals, Inc., the supplier, appears on pages 307 and 308. The actual dates when thioabendazole, piperazine, and dichlorvos were administered to the dogs prior to shipment to SRI are given on page 309.

When the dogs were received at SRI, they were given an immediate general physical examination. They were then treated with 1 cc (in some cases the dose was repeated) of either Bi-cillin, Gentocin or Combiotic antibiotic and immunized with one dose of Pitman-Moore's Tissue Vax #5. No other treatment or medication was given to the dogs during the study except as follows:

C0-06 8/9/78, right hind foot (3rd digit) painful on palpation and swollen; no bone condition. Treated by massaging foot with Unisel.

C1-11 3/24/78, acute conjunctivitis, no irritating object within the eye--possible allergy.

Treated with: .25 mg dexamethasone i.m.
.2 ml Gentocin i.m.
Chlorasone infused into conjunctival sac
Weekend crew treated next 2 days with
.5 cc Gentocin i.m. one day, Chlorasone
each day

3/28/78, Chlorasone infused into conjunctival sac

3/30-4/14/78, Chlorasone infused

C3-37 3/28/78, put in cage indoors, left foreleg swollen

3/31/78, put in outdoor run by himself; foot much better;
given 1 cc of Flocillin and 0.2 cc of Azium i.m.

PRODUCTS USED IN BEAGLE PRODUCTION COLONY

VACCINES

DISTEMPER-HEPATITIS-LEPTOSPIROSIS

DELCINE HL produced by Dellen Labs., Inc., Omaha, Nebr 68134

The Distemper and Hepatitis fractions are a modified live virus with a canine tissue culture origin.

The Leptospirosis fraction contains physically inactivated Leptospira Canicola and Icterohemorrhagiae Bacterin.

DISTEMPER Modified Live Virus-Chick Tissue Culture Origin
(given alone) Produced by American Scientific Lab., Madison, Wisc.

RABIES Modified Live Virus-Chick Embryo Origin
Produced by Fromm Laboratories Inc., Grafton, Wisc.

Rabies vaccine is given when requested, but is not routinely given in the colony.

MART An autogenous vaccine for Oral Papilloma. Produced exclusively by and for Marshall Research Animals, Inc.

NINE PARAINFLUENZA - Modified Virus
Produced by Norden Laboratories, Lincoln, Nebr.

ORDETELLA BRONCHISEPTICA BACTERIN
Produced by Chromalloy Pharmaceutical Inc., Omaha, Nebr.

ANTHELMINICS

Piperazine Citrate
Thiabendazole (Thibenzole) Merck & Co., Inc.

KENNELWIDE TREATMENT (see attached detailed record)

Piperazine is given routinely to all dogs every two to four weeks

Thiabendazole is substituted for routine piperazine treatment at varying intervals.

Dichlorvos Shell Chemical Co.

INDIVIDUAL PUPPY TREATMENT-All pups are treated individually with piperazine at approximately 3 and 4½ weeks of age.

HG (Code used on histories) This refers to the surgical removal of a hypertrophied Harder's Gland (Third Eyelid)

*PROTHROMBIN TIME The prothrombin time listed on the history is determined by the hyland clotek system, using Rabbit Brain Tissue.

PCV These values are arrived at by the microhematocrit method.

PRODUCTS USED IN BEAGLE PRODUCTION COLONY

VACCINES

DISTEMPER-HEPATITIS-LEPTOSPIROSIS

DELCINE HL produced by Dellen Labs., Inc., Omaha, Nebraska 68134

The Distemper and Hepatitis fractions are a modified live virus with a canine tissue culture origin.

The Leptospirosis fraction contains physically inactivated *Leptospira canicola* and *Icterohaemorrhagiae* organisms.

DISTEMPER
(given alone)

Modified Live Virus-Chick Tissue Culture Origin

produced by American Scientific Laboratories
Madison, Wisconsin

RABIES

Modified Live Virus-Chick Embryo Origin

produced by Fromm Laboratories, Inc.
Grafton, Wisconsin 53024

Rabies vaccine is given when requested but is not routinely given in the colony.

WART VACCINE

An autogenous vaccine for Oral Papilloma. Produced exclusively by and for Marshall Research Animals, Inc.

ANTHELMINTICS

Piperazine
Thiabendazole

-Various brands used
-(Omnizole) Merck and Co., Inc.

HG - (Code used on histories) This refers to the surgical removal of a hypertrophied Harder's Gland (Third Eyelid)

KENNELWIDE TREATMENT

Piperazine is given routinely to all dogs every two to four weeks.

Thiabendazole is substituted for routine piperazine treatment at varying intervals.

INDIVIDUAL PUPPY TREATMENT All pups are treated individually with piperazine at approximately 3 and 4½ weeks of age.

PROTHROMBIN TIME *The prothrombin time listed on the history is determined by the Hyland Clotek System, using Rabbit Brain Tissue **Those dogs showing no Prothrombin time have not been tested, but are believed to be normal.

THIABENDAZOLE PIPERAZINE DICHLORVOS

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Appendix D
LINEAR TREND ANALYSIS

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The data obtained from the subacute studies with condensate wastewater (Part 2) were analyzed statistically for linear trends. The linear trend test is a procedure for establishing the existence of a linear trend in the mean response among the dose-treated groups. More precisely, this test seeks to uncover linear trends as a function of the logarithm of the dose. To compute this test a linear regression of response versus log dose is first computed (excluding the control group). This linear regression takes the form

$$Y_{ij} = a + b \cdot \log d_i$$

where

Y_{ij} = response of j-th animals in the i-th dose group
(e.g., weight, hematology, or clinical chemistry measurement).

d_i = dose administered to the i-th group.

An F test is used to test the hypothesis that $b = 0$. If the hypothesis can be rejected (e.g., a linear trend exists) at the 5% significance level (e.g., with 95% confidence), then a "*" is printed in the appropriate position on the summary table. If the hypothesis can be rejected at the 1% significance level (e.g., with 99% confidence), then a "+" is printed in the appropriate position on the summary table.

The results are summarized in Tables D-1 through D-12. The parameters analyzed were body weights and weight differences, organ weights and weight ratios, and hematological and clinical chemistry values.

TABLE D-1

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON DOG ORGAN WEIGHTS AND WEIGHT RATIOS

DEPENDENT	TABLE NUMBER	
<u>VARIABLE</u>	<u>12</u>	<u>13</u>
FINAL WT (KG)		
BRAIN		
THYROID		
HEART		
LIVER		
SPLEEN		
ADRENAL		
KIDNEYS	+	+
GONADS		
BRAIN/BODY		
THYROID/BODY		
HEART/BODY		
LIVER/BODY		
SPLEEN/BODY		
ADRENAL/BODY		
KIDNEY/BODY	*	*
GONAD/BODY		
THYROID/BRAIN		
HEART/BRAIN		
LIVER/BRAIN		
SPLEEN/BRAIN		
ADRENAL/BRAIN		
KIDNEY/BRAIN	*	*
GONAD/BRAIN		

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-2

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON HEMATOLOGY OF DOGS

DEPENDENT VARIABLE	TABLE NUMBER							
	16	17	18	19	20	21	22	23
RBC			*	*	*	*		
HGB			+	*		*		
HCT								
MCV				*		*	*	
MCH	+							
MCHC	*	*					+	
WBC								
PMN								
BANDS								
LYMPH								
ATYP LYMP								
MONO	*							
EOSIN								
BASO								
RETIC			+				+	*

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-3

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON CLINICAL CHEMISTRY OF DOGS

DEPENDENT VARIABLE	TABLE NUMBER						
	24	25	26	27	28	29	30 31
ALBUMIN							
ALK-P							
BUN					*		
CA			+	+			
CHOL							
CREAT				*	+		
GLUC			*				
P					*		
LDH		*	*	+			
TRIG	+			*			
URIC ACID					*		
PROTEIN					+		
SGPT							
SGOT		*					
BILI						*	

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-4

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON RAT BODY WEIGHTS

DEPENDENT VARIABLE	TABLE NUMBER					
	34	35	38	39	40	41
INITIAL						
WEEK 1	+	+		+	*	+
WEEK 2	+	+	*	+	*	+
WEEK 3	+	+	*	+	+	+
WEEK 4	+	+	+	+	+	+
WEEK 5	+	+	+	+	+	+
WEEK 6	+	+	*	+	+	+
WEEK 7	+	+	*	+	+	+
WEEK 8	+	+	*	*	+	+
WEEK 9	+	+	-	-	+	+
WEEK 10	+	+	-	-	+	+
WEEK 11	+	+	-	-	+	+
WEEK 12	+	+	-	-	+	+
WEEK 13	+	+	-	-	+	+
WEEK 14	-	-	-	-	+	+
WEEK 15	-	-	-	-	+	+
WEEK 16	-	-	-	-	+	+
WEEK 17	-	-	-	-	+	+

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-5

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS ON
DIFFERENCES IN RAT BODY WEIGHTS

DEPENDENT VARIABLE	TABLE NUMBER					
	36	37	42	43	44	45
WEEK 1	+	+	*	+	+	+
WEEK 2	+	+	*	+	+	*
WEEK 3	+		+	*	+	
WEEK 4	+	+	+			+
WEEK 5	+		+	+	*	
WEEK 6	+					
WEEK 7	+				*	
WEEK 8	*				*	
WEEK 9	*		-	-		
WEEK 10	+		-	-	+	
WEEK 11	+	*	-	-	*	*
WEEK 12	+		-	-	*	
WEEK 13			-	-		
WEEK 14	-	-	-	-		
WEEK 15	-	-	-	-		
WEEK 16	-	-	-	-		
WEEK 17	-	-	-	-		

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-6

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS ON ORGAN WEIGHTS
AND WEIGHT RATIOS OF RATS

DEPENDENT VARIABLE	TABLE NUMBER							
	60	64	62	66	61	65	63	67
FINAL WT	+	*	+	+	+	*	+	+
BRAIN			*					
HEART			+		*	*	+	
LIVER	*							
SPLEEN	+		+		+		+	
KIDNEYS	+			*				
TESTES	+	+	*	+				
BRAIN/BODY	+	*	+		+		+	+
HEART/BODY		*	+	*				
LIVER/BODY			+	+	+		+	*
SPLEEN/BODY	+		+	*	+		+	
KIDNEY/BODY			+	+		*		
TESTES/BODY	+	*						
HEART/BRAIN					+	*	*	
LIVER/BRAIN	*		*					
SPLEEN/BRAIN	+		+					
KIDNEY/BRAIN	+							
TESTES/BRAIN	+	+	*	+				

LINEAR TREND TESTS OF LOG DOSES

+ CONFIDENCE LEVEL = .99

* CONFIDENCE LEVEL = .95

- VARIABLE NOT INCLUDED IN TABLE

TABLE D-7

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON HEMATOLOGY OF RATS

DEPENDENT VARIABLE	TABLE NUMBER							
	68	69	72	73	70	71	74	75
RBC	*				*	+		*
HGB		*	+	*	+	+		+
HCT			*				*	+
MCV	+	+	*	+	+	+	+	*
MCH	+							
MCHC								+
WBC	+		*		+	*		
PMN	*							
BANDS				+				
LYMPH	*					+		
ATYP LYMP				*		+		
MONO								+
EOSIN								
BASO								
RETIC	+	+		+	*	+		

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-8

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON CLINICAL CHEMISTRY OF RATS

DEPENDENT VARIABLE	TABLE NUMBER							
	76	77	80	81	78	79	82	83
ALBUMIN		*		*			+	
ALK-P								
BUN					+			
CA	+	*			*		+	
CHOL	+					+	+	
CREAT		+				*		
GLUC	*	+		+	*	*		
P				+	+		+	+
LDH								*
TRIG					+			*
URIC ACID	+	*						
PROTEIN	*		*			*		
SGPT	*				+			
SGOT					+			
BILI			*					

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-9

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON MICE BODY WEIGHTS

DEPENDENT VARIABLE	TABLE NUMBER					
	92	93	94	95	96	97
INITIAL						
WEEK 1						
WEEK 2						*
WEEK 3	+	*				*
WEEK 4	+	+		*		*
WEEK 5						
WEEK 6	+	+				*
WEEK 7	*	*				*
WEEK 8	+	+			*	+
WEEK 9	*	+	-	-		+
WEEK 10		+	-	-		*
WEEK 11		+	-	-		*
WEEK 12	*	*	-	-		*
WEEK 13		*	-	-		*
WEEK 14	-	-	-	-		*
WEEK 15	-	-	-	-		*
WEEK 16	-	-	-	-		
WEEK 17	-	-	-	-		

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-10

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS ON
DIFFERENCES IN MICE BODY WEIGHTS

DEPENDENT VARIABLE	TABLE NUMBER					
	98	99	100	101	102	103
WEEK 1				*		*
WEEK 2						
WEEK 3	+					
WEEK 4	+	+			*	
WEEK 5						
WEEK 6	+				*	
WEEK 7						
WEEK 8		+			+	+
WEEK 9			-	-		
WEEK 10	+		-	-	+	
WEEK 11			-	-		
WEEK 12	*		-	-		
WEEK 13			-	-		
WEEK 14	-	-	-	-		
WEEK 15	-	-	-	-		
WEEK 16	-	-	-	-		
WEEK 17	-	-	-	-	*	

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-11

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS ON ORGAN WEIGHTS
AND WEIGHT RATIOS OF MICE

DEPENDENT VARIABLE	TABLE NUMBER							
	118	122	120	124	119	123	121	125
FINAL. WT	+		+	*				
BRAIN								
HEART								
LIVER	*							
SPLEEN								*
KIDNEYS	*							
TESTES	+		+	*				
BRAIN/BODY	+			*				
HEART/BODY								
LIVER/BODY			*	*	+			
SPLEEN/BODY			*		*		+	
KIDNEY/BODY				*				
TESTES/BODY	+		+					
HEART/BRAIN								
LIVER/BRAIN	*							*
SPLEEN/BRAIN								+
KIDNEY/BRAIN	*							
TESTES/BRAIN	+		+					

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

TABLE D-12

LINEAR TREND ANALYSIS OF CONDENSATE WATER EFFECTS
ON HEMATOLOGY OF MICE

DEPENDENT VARIABLE	TABLE NUMBER							
	126	127	130	131	128	129	132	133
RBC		*					*	
HGB			*					
HCT		*						
MCV		*						
MCH				*	+			
MCHC					*			
WBC								*
PMN			*	*	*			*
BANDS								
LYMPH		*			*			
ATYP LYMP				*				
MONO								
EOSIN								
BASO								
RETIC		+						

LINEAR TREND TESTS OF LOG DOSES
 + CONFIDENCE LEVEL = .99
 * CONFIDENCE LEVEL = .95
 - VARIABLE NOT INCLUDED IN TABLE

Appendix E
BACKGROUND DATA

Tables E-1 through E-6 are a compilation of measurements on control animals in studies conducted at SRI over the period spanned by the mammalian toxicological studies on TNT and TNT wastewaters. The number of determinations, mean and standard error, and normal range are provided for each measured parameters. The normal range is calculated on the assumption that the data fit a normal distribution and comprise plus and minus two standard deviations from the mean.

Tables E-7 and E-8 summarize hematology and clinical chemistry determinations on the beagles supplied to us by Marshall Laboratory Animals. These determinations were made by the Laboratory's customers.

TABLE E-1

POOLED STATISTICS FOR SUBACUTE DOG STUDIES AT SRI*

MALES

VARIABLE	N	MEAN	SE	NORMAL RANGE (± 2 S.D.)
INITIAL	60	9.63	.20	6.54 - 12.73
WEEK 1	15	9.58	.41	6.40 - 12.76
WEEK 2	15	9.73	.41	6.52 - 12.93
WEEK 3	15	9.79	.36	6.98 - 12.60
WEEK 4	15	9.97	.38	6.99 - 12.94
WEEK 5	13	9.94	.41	7.01 - 12.87
WEEK 6	13	9.98	.41	7.06 - 12.91
WEEK 7	13	10.11	.43	7.02 - 13.19
WEEK 8	13	10.11	.41	7.19 - 13.03
WEEK 9	11	10.47	.42	7.71 - 13.23
WEEK 10	11	10.54	.39	7.93 - 13.14
WEEK 11	11	10.64	.38	8.14 - 13.13
WEEK 12	11	10.66	.37	8.18 - 13.14
WEEK 13	11	10.78	.38	8.26 - 13.30
WEEK 14	6	10.33	.36	8.58 - 12.08
WEEK 15	6	10.32	.35	8.59 - 12.04
WEEK 16	6	10.27	.41	8.26 - 12.27
WEEK 17	6	10.43	.41	8.44 - 12.43
WEEK 18	5	10.58	.45	8.57 - 12.59
WEEK 19	5	10.74	.49	8.57 - 12.91
WEEK 20	5	10.70	.55	8.23 - 13.17
WEEK 21	5	10.64	.51	8.37 - 12.91
WEEK 22	5	10.56	.52	8.23 - 12.89
WEEK 23	5	10.54	.53	8.17 - 12.91
WEEK 24	5	10.18	.47	8.06 - 12.30
FINAL	13	10.80	.32	8.49 - 13.11
BRAIN	13	82.82	1.16	74.45 - 91.19
THYROID	13	107.63	4.18	77.50 - 137.75
HEART	13	59.36	2.97	37.95 - 80.77
LIVER	13	395.13	21.95	236.84 - 553.43
SPLEEN	13	31.70	2.71	12.14 - 51.27
ADRENAL	13	18.16	1.20	9.54 - 26.78
KIDNEYS	13	1.50	.12	.65 - 2.36
TESTES	13	.96	.08	.38 - 1.53
RBC	60	6.04	.07	5.01 - 7.07
HGB	60	14.45	.13	12.44 - 16.46
HCT	60	41.45	.43	34.77 - 48.13
MCV	60	68.52	.25	64.67 - 72.36
MCH	60	24.03	.16	21.61 - 26.45
MCHC	60	34.75	.33	29.66 - 39.84
WBC	60	12.08	.27	7.86 - 16.29
PMN	41	56.17	1.13	41.64 - 70.70
BANDS	41	1.31	.21	0.00 - 4.09
LYMPH	41	27.80	.93	15.17 - 39.90
MONO	41	5.43	.37	.68 - 10.17
EOSIN	41	8.03	.71	0.00 - 17.18
BASO	41	0.00	0.00	0.00 - 0.00
ATYP LYMPH	20	1.27	.22	0.00 - 3.21
RETIC	40	.74	.07	0.00 - 1.60
GLUCOSE	60	105.51	1.47	82.80 - 128.22
BUN	60	14.62	.53	6.36 - 22.89
CREAT	60	.75	.01	.55 - .94
URIC ACID	60	.68	.06	0.00 - 1.58
NA	40	145.34	.35	140.88 - 149.80
K	40	4.90	.05	4.32 - 5.48
CO2	40	21.69	.25	18.50 - 24.88
CL	40	109.81	2.32	80.43 - 139.19
CA	60	11.11	.14	8.89 - 13.34
P	60	6.78	.38	.97 - 12.59
NA- (Cl + CO ₂)	40	11.59	.35	7.20 - 15.98
CHOL	60	154.58	4.40	86.45 - 222.70
TRIG	60	41.21	2.52	2.16 - 80.26
BILI	59	.24	.03	0.00 - .68
SGOT	60	35.05	1.18	16.76 - 53.33
SGPT	60	35.13	1.41	13.25 - 57.01
LDH	60	62.54	4.20	0.00 - 127.65
ALK-P	60	116.10	6.28	18.75 - 213.44
IRON	40	197.89	7.54	102.47 - 293.30
PROTEIN	60	5.72	.06	4.79 - 6.65
ALBUMIN	60	3.60	.08	2.31 - 4.88
GLOBULIN	40	2.20	.12	.67 - 3.73
A/G RATIO	40	1.90	.16	0.00 - 3.91

* Over the period September 1976 through September 1978.

POOLED STATISTICS FOR SUBACUTE DOG STUDIES AT SRI*

FEMALES

VARIABLE	N	MEAN	SE	NORMAL RANGE (± 2 S.D.)
INITIAL	60	8.65	.20	5.60 - 11.69
WEEK 1	15	8.48	.37	5.63 - 11.33
WEEK 2	15	8.44	.34	5.79 - 11.09
WEEK 3	15	8.46	.33	5.89 - 11.03
WEEK 4	15	8.65	.35	5.96 - 11.33
WEEK 5	13	8.53	.35	6.00 - 11.06
WEEK 6	13	8.55	.35	6.04 - 11.06
WEEK 7	13	8.67	.35	6.18 - 11.16
WEEK 8	13	8.65	.35	6.12 - 11.19
WEEK 9	11	8.71	.38	6.19 - 11.23
WEEK 10	11	8.73	.39	6.14 - 11.31
WEEK 11	11	8.76	.39	6.19 - 11.34
WEEK 12	11	8.73	.37	6.25 - 11.20
WEEK 13	11	8.85	.38	6.33 - 11.38
WEEK 14	6	8.43	.47	6.15 - 10.72
WEEK 15	6	8.38	.51	5.86 - 10.90
WEEK 16	6	8.40	.56	5.67 - 11.13
WEEK 17	6	8.32	.52	5.76 - 10.87
WEEK 18	5	8.42	.70	5.30 - 11.54
WEEK 19	5	8.36	.65	5.46 - 11.26
WEEK 20	5	8.36	.69	5.29 - 11.43
WEEK 21	5	8.42	.69	5.35 - 11.49
WEEK 22	5	8.16	.68	5.12 - 11.20
WEEK 23	5	8.22	.67	5.23 - 11.21
WEEK 24	5	8.08	.68	5.03 - 11.13
FINAL	13	8.88	.35	6.35 - 11.41
BRAIN	13	80.38	1.29	71.08 - 89.67
THYROID	13	87.01	2.76	67.08 - 106.93
HEART	13	43.46	1.40	33.36 - 53.56
LIVER	13	325.00	14.82	218.14 - 431.86
SPLEEN	13	33.82	4.75	0.00 - 68.06
ADRENAL	13	1.49	.20	.05 - 2.92
KIDNEYS	13	1.39	.07	.92 - 1.86
TESTES	13	1.03	.07	.55 - 1.50
RBC	60	6.33	.08	5.07 - 7.59
HGB	60	15.32	.16	12.77 - 17.87
HCT	60	43.69	.54	35.28 - 52.09
MCV	60	68.76	.21	65.57 - 71.95
MCH	60	24.19	.16	21.72 - 26.66
MCHC	60	35.05	.20	31.96 - 38.14
WBC	60	12.03	.30	7.39 - 16.67
PMN	41	58.49	1.18	43.42 - 73.55
BANDS	41	1.59	.56	0.00 - 8.64
LYMPH	41	26.70	1.14	12.13 - 41.29
MONO	41	9.80	1.48	0.00 - 28.75
EOSIN	41	8.25	1.00	0.00 - 20.88
BASO	41	0.00	0.00	0.00 - 0.00
ATYP LYMPH	20	.94	.24	0.00 - 3.12
RETIC	40	.72	.10	0.00 - 1.93
GLUCOSE	60	106.31	1.35	85.38 - 127.25
BUN	60	15.26	.55	6.71 - 23.81
CREAT	60	.75	.01	.56 - .94
URIC ACID	60	.67	.06	0.00 - 1.58
NA	40	146.39	.27	143.02 - 149.75
K	40	4.74	.04	4.26 - 5.21
CO2	40	22.04	.26	18.78 - 25.30
Cl	40	111.77	.25	108.58 - 114.97
CA	60	11.24	.12	9.43 - 13.06
P	60	6.59	.35	1.24 - 11.94
NA-(Cl + CO ₂)	40	12.57	.31	8.71 - 16.44
CHOL	60	153.94	4.26	87.89 - 219.99
TRIG	60	40.80	2.42	3.31 - 78.29
BILI	60	.25	.03	0.00 - .67
SGOT	60	33.48	.91	19.41 - 47.55
SGPT	60	30.43	1.24	11.21 - 49.65
LDH	60	53.51	3.79	0.00 - 112.16
ALK-P	60	98.36	4.34	31.15 - 165.57
IRON	40	188.95	7.81	90.14 - 287.77
PROTEIN	60	5.69	.03	4.87 - 6.50
ALBUMIN	60	3.73	.08	2.47 - 4.98
GLOBULIN	40	2.11	.12	.60 - 3.61
A/G RATIO	40	2.11	.18	0.00 - 4.36

* Over the period September 1976 through September 1978.

TABLE E-3
POOLED STATISTICS FOR SURACUTE RAT STUDIES AT SRI

VARIABLE	N	MALES			NORMAL RANGE (+ 2 S.D.)
		MEAN	SE		
INITIAL	70	151.41	1.93		119.19 - 183.64
WEEK 1	70	200.41	2.67		155.68 - 245.15
WEEK 2	69	252.96	2.47		211.89 - 294.03
WEEK 3	69	291.77	2.69		247.15 - 336.39
WEEK 4	69	324.23	3.12		272.32 - 376.15
WEEK 5	50	348.58	4.01		291.85 - 405.31
WEEK 6	50	369.46	4.06		312.01 - 426.91
WEEK 7	50	390.32	4.77		322.79 - 457.85
WEEK 8	50	410.44	5.33		335.02 - 485.86
WEEK 9	40	425.95	6.49		343.86 - 508.04
WEEK 10	40	443.02	6.41		361.93 - 524.12
WEEK 11	40	453.20	7.20		362.17 - 544.23
WEEK 12	40	462.97	8.10		360.56 - 565.39
WEEK 13	40	465.47	9.51		345.24 - 585.71
WEEK 14	10	487.40	13.51		401.96 - 572.84
WEEK 15	10	498.80	15.21		402.58 - 595.02
WEEK 16	10	502.90	14.30		412.46 - 593.34
WEEK 17	10	486.20	13.58		400.32 - 572.08
BRAIN	69	2.17	.02		1.79 - 2.55
HEART	69	1.52	.04		.87 - 2.17
KIDNEYS	69	3.31	.07		2.07 - 4.54
LIVER	69	14.17	.38		7.94 - 20.40
SPLEEN	69	.75	.02		.47 - 1.02
TESTES	69	3.35	.08		2.03 - 4.68
RBC	62	7.72	.09		6.33 - 9.12
HGB	62	14.97	.11		13.20 - 16.74
HCT	62	40.67	.37		34.81 - 46.53
MCV	62	53.27	.43		46.53 - 60.02
MCH	62	19.50	.22		16.09 - 22.92
MCHC	62	36.89	.38		30.92 - 42.87
WBC	62	8.30	.34		2.89 - 13.70
PMN	62	15.84	.70		4.82 - 26.86
BANDS	62	.37	.09		0.00 - 1.83
LYMPH	62	79.16	.77		67.04 - 91.28
MONO	52	3.48	.25		0.00 - 7.08
EOSIN	34	1.35	.10		.16 - 2.55
BASO	63	0.00	0.00		0.00 - 0.00
ATYP LYMPH	25	2.04	.33		0.00 - 5.38
RETIC	25	.94	.15		0.00 - 2.44
GLUCOSE	66	152.94	4.35		82.24 - 223.64
BUN	66	18.18	.53		9.64 - 26.72
CREAT	64	.59	.02		.31 - .87
URIC ACID	61	1.85	.14		0.00 - 4.01
NA	36	143.92	.42		138.85 - 148.98
K	64	6.34	.23		2.65 - 10.03
CO2	36	24.50	.58		17.56 - 31.44
Cl	36	102.33	.47		96.74 - 107.93
CA	55	9.38	.10		7.97 - 10.79
P	36	6.24	.16		4.27 - 8.20
NA-(Cl + CO ₂)	36	17.08	.74		8.19 - 25.98
CHOL	64	45.77	3.06		0.00 - 94.69
TRIG	64	95.91	8.87		0.00 - 237.67
BILI	59	.32	.04		0.00 - .88
SGOT	66	107.38	4.45		35.04 - 179.71
SGPT	66	37.67	1.48		13.54 - 61.79
LDH	61	785.82	65.57		0.00 - 1810.00
ALK-P	57	204.19	12.53		14.98 - 393.41
IRON	36	194.25	7.34		106.14 - 282.36
PROTEIN	64	6.24	.08		5.02 - 7.47
ALBUMIN	64	4.46	.12		2.52 - 6.40
GLOBULIN	36	1.81	.21		0.00 - 4.35
A/G RATIO	36	5.91	1.06		0.00 - 18.55

TABLE E-4
POOLED STATISTICS FOR SUBACUTE RAT STUDIES AT SRI

FEMALES				
VARIABLE	N	MEAN	SE	NORMAL RANGE (+ 2 S.D.)
INITIAL	70	151.91	2.13	116.27 - 187.56
WEEK 1	70	175.39	1.32	153.30 - 197.47
WEEK 2	70	196.63	1.30	174.95 - 218.31
WEEK 3	70	210.70	1.46	186.30 - 235.10
WEEK 4	70	222.91	1.60	196.22 - 249.61
WEEK 5	50	233.62	2.06	204.49 - 262.75
WEEK 6	50	244.50	2.39	210.64 - 278.36
WEEK 7	50	250.90	2.66	213.35 - 288.45
WEEK 8	50	258.92	2.74	220.14 - 297.70
WEEK 9	40	266.02	3.43	222.65 - 309.40
WEEK 10	40	273.85	3.85	225.10 - 322.60
WEEK 11	40	277.95	4.04	226.81 - 329.09
WEEK 12	40	282.30	3.60	236.71 - 327.89
WEEK 13	40	281.90	3.66	235.57 - 328.23
WEEK 14	10	274.40	4.39	246.62 - 302.18
WEEK 15	10	278.10	4.31	250.87 - 305.33
WEEK 16	10	279.20	4.41	251.33 - 307.07
WEEK 17	10	270.00	4.40	242.18 - 297.82
BRAIN	70	2.02	.02	1.74 - 2.31
HEART	70	1.02	.02	.61 - 1.43
KIDNEYS	70	1.93	.03	1.42 - 2.44
LIVER	70	8.00	.16	5.26 - 10.73
SPLEEN	70	.56	.01	.36 - .76
RBC	67	7.35	.07	6.20 - 8.50
HGB	67	14.80	.12	12.91 - 16.68
HCT	67	39.42	.42	32.61 - 46.23
MCV	67	54.24	.22	50.60 - 57.88
MCH	68	19.84	.35	13.99 - 25.68
MCHC	67	37.64	.38	31.42 - 43.87
WBC	67	6.77	.28	2.27 - 11.28
PMN	67	15.75	1.07	0.00 - 33.28
BANDS	66	.39	.10	0.00 - 2.07
LYMPH	67	79.84	1.08	62.10 - 97.57
MONO	50	3.22	.24	0.00 - 6.68
EOSIN	31	2.00	.26	0.00 - 4.92
BASO	70	0.00	0.00	0.00 - 0.00
ATYP LYMPH	30	1.60	.21	0.00 - 3.87
RETIC	30	1.04	.15	0.00 - 2.66
GLUCOSE	65	147.15	3.35	93.08 - 201.23
BUN	65	18.38	.61	8.60 - 28.17
CREAT	63	.60	.01	.37 - .82
URIC ACID	59	1.86	.12	0.00 - 3.78
NA	33	142.03	.51	136.17 - 147.89
K	63	6.10	.21	2.72 - 9.48
CO2	33	21.85	.66	14.31 - 29.38
CL	33	103.70	.53	97.60 - 109.79
CA	53	10.19	.15	8.06 - 12.33
P	33	5.40	.23	2.80 - 8.00
NA ⁺ (Cl + CO ₂)	33	16.48	.65	8.97 - 24.00
CHOL	63	64.19	1.93	33.49 - 94.89
TRIG	63	57.51	5.82	0.00 - 149.90
BILI	63	.34	.04	0.00 - .94
SGOT	65	101.15	6.35	0.00 - 203.52
SGPT	65	34.88	2.50	0.00 - 75.24
LDH	64	608.80	46.65	0.00 - 1355.14
ALK-P	55	131.16	9.38	0.00 - 270.35
IRON	33	339.42	11.94	202.29 - 476.56
PROTEIN	63	6.60	.09	5.13 - 8.06
ALBUMIN	63	4.75	.14	2.50 - 6.99
GLOBULIN	30	1.96	.23	0.00 - 4.53
A/G RATIO	30	5.51	1.17	0.00 - 18.30

TABLE E-5
POOLED STATISTICS FOR SUBACUTE MOUSE STUDIES AT SRI

MALES					
VARIABLE	N	MEAN	SE	NORMAL RANGE (+ 2 S.D.)	
INITIAL	60	23.17	.37	17.45 -	28.89
WEEK 1	60	24.83	.49	17.29 -	32.38
WEEK 2	59	25.75	.55	17.31 -	34.18
WEEK 3	58	26.24	.64	16.56 -	35.93
WEEK 4	57	29.07	.52	21.15 -	36.99
WEEK 5	47	30.79	.58	22.89 -	38.69
WEEK 6	47	31.70	.55	24.19 -	39.22
WEEK 7	47	31.98	.63	23.36 -	40.60
WEEK 8	47	34.55	.66	25.52 -	43.58
WEEK 9	37	33.97	.68	25.68 -	42.27
WEEK 10	37	34.43	.69	26.05 -	42.82
WEEK 11	37	35.41	.67	27.25 -	43.56
WEEK 12	37	36.00	.66	27.93 -	44.07
WEEK 13	37	36.05	.69	27.66 -	44.45
WEEK 14	10	38.20	.99	31.96 -	44.44
WEEK 15	10	39.60	1.02	33.12 -	46.08
WEEK 16	10	38.90	.91	33.13 -	44.67
WEEK 17	10	38.10	.86	32.65 -	43.55
BRAIN	57	.53	.01	.44 -	.62
HEART	57	.19	.01	.11 -	.27
KIDNEYS	57	.55	.01	.33 -	.78
LIVER	57	1.87	.06	1.00 -	2.74
SPLEEN	57	.12	.01	.04 -	.20
TESTES	57	.26	.01	.15 -	.38
RBC	47	7.77	.18	5.37 -	10.18
HGB	47	13.96	.23	10.80 -	17.11
HCT	47	39.40	.86	27.66 -	51.14
MCV	47	50.96	.45	44.74 -	57.17
MCH	47	18.28	.29	14.37 -	22.19
MCHC	47	36.09	.62	27.57 -	44.60
WBC	47	6.59	.50	0.00 -	13.49
PMN	45	21.27	1.43	2.06 -	40.48
BANDS	46	.15	.07	0.00 -	1.09
LYMPH	46	73.39	1.66	50.84 -	95.95
MONO	46	2.35	.32	0.00 -	6.71
EOSIN	46	1.67	.26	0.00 -	5.25
BASO	46	0.00	0.00	0.00 -	0.00
ATYP LYMPH	29	1.97	.37	0.00 -	5.98
RETIC	30	1.40	.24	0.00 -	4.01

TABLE E-6
POOLED STATISTICS FOR SUBACUTE MOUSE STUDIES AT SRI

FEMALES				
VARIABLE	N	MEAN	SE	NORMAL RANGE (+ 2 S.D.)
INITIAL	60	22.05	.35	16.66 - 27.44
WEEK 1	60	22.95	.44	16.20 - 29.70
WEEK 2	60	23.38	.47	16.04 - 30.73
WEEK 3	60	23.70	.56	15.01 - 32.39
WEEK 4	59	25.41	.53	17.24 - 33.58
WEEK 5	49	25.90	.56	18.01 - 33.79
WEEK 6	49	26.73	.63	17.94 - 35.53
WEEK 7	49	27.92	.55	20.28 - 35.55
WEEK 8	48	28.19	.55	20.52 - 35.86
WEEK 9	38	28.97	.64	21.12 - 36.83
WEEK 10	38	28.66	.62	20.97 - 36.34
WEEK 11	38	29.29	.57	22.25 - 36.32
WEEK 12	38	29.11	.77	19.65 - 38.56
WEEK 13	38	30.05	.68	21.62 - 38.49
WEEK 14	9	30.56	1.59	21.01 - 40.10
WEEK 15	9	32.00	1.61	22.36 - 41.64
WEEK 16	9	31.67	1.53	22.50 - 40.83
WEEK 17	9	31.67	1.70	21.47 - 41.86
BRAIN	58	.53	.01	.41 - .65
HEART	58	.16	.01	.07 - .25
KIDNEYS	58	.41	.01	.26 - .57
LIVER	58	1.64	.05	.88 - 2.39
SPLEEN	58	.12	.00	.05 - .19
RBC	45	8.24	.20	5.52 - 10.97
HGB	45	14.69	.23	11.59 - 17.79
HCT	45	41.30	1.03	27.53 - 55.07
MCV	45	49.89	.41	44.44 - 55.34
MCH	45	18.08	.28	14.27 - 21.89
MCHC	45	36.27	.61	28.07 - 44.47
WBC	45	6.41	.43	.70 - 12.11
PMN	45	18.87	1.27	1.89 - 35.84
BANDS	44	.59	.23	0.00 - 3.62
LYMPH	45	76.09	1.39	57.42 - 94.76
MONO	45	1.67	.26	0.00 - 5.13
EOSIN	45	1.89	.36	0.00 - 6.77
BASO	45	.04	.04	0.00 - .64
ATYP LYMPH	28	1.75	.28	0.00 - 4.71
RETIC	28	1.36	.20	0.00 - 3.43

Table E-7

HEMATOLOGY OF BEAGLES FROM MARSHALL LABORATORY ANIMALS*

Parameter	Values†	
	Males	Females
Hgb (g %)	15.6 ± 1.9	16.3 ± 2.2
Hct (%)	45.4 ± 5.6	47.9 ± 4.4
WBC (x 10 ³)	15.0 ± 3.7	13.7 ± 3.4
PMN (%)	60.6 ± 12.8	61.8 ± 8.8
Lymphocytes (%)	33.7 ± 7.6	34.8 ± 8.4
Monocytes (%)	1.3 ± 1.2	1.1 ± 1.2
Eosinophils (%)	2.5 ± 2.7	2.1 ± 3.0
Basophils (%)	0.08 ± 0.35	0.045 ± 0.3
Retic (% x 1000 RBC)	0.37 ± 0.36	0.42 ± 0.40

* Values are derived from averages for 100 male or 100 female dogs (age, 9 to 12 months) supplied to Marshall Research on its beagles by customers.

† Means ± standard error.

Table E-8

CLINICAL CHEMISTRY OF BEAGLES FROM MARSHALL LABORATORY ANIMALS^a

Parameter	Males	Females
Glucose (mg %)	80 ± 7.6	76.5 ± 10.4
BUN (mg %)	15.9 ± 4.0	17.8 ± 4.3
Serum Na ⁺ (meq/liter)	149.8 ± 12.4	149.1 ± 16.7
Serum K ⁺ (meq/liter)	4.9 ± 0.48	4.8 ± 0.49
SGOT (Wrobl. units)	16.4 ± 13.1	16.7 ± 13.4
SGPT (Wrobl. units)	10.4 ± 9.1	11.5 ± 7.5
Alk-P (Bessy-Lowry units)	2.8 ± 1.0	2.4 ± 1.2
Serum protein (mg %)	6.0 ± 0.62	6.1 ± 0.70

^aValues are derived from averages for 100 male or 100 female dogs (age, 9 to 12 mo) supplied to Marshall Research on its beagles by customer.

^bMeans ± standard error.

Appendix F

NEUROPATHOLOGY CONSULTANT'S REPORT

16181 Greenwood Lane
Los Gatos, CA 95030
18 Dec 78

REPORT TO SRI ON THE NERVOUS SYSTEM OF DOGS
EXPERIMENTALLY EXPOSED TO A POTENTIALLY TOXIC SUBSTANCE

Summary

A study was made of selected levels of the central nervous system (CNS) in 29 experimental dogs and 10 control dogs. Detailed study was made of the nervous system in an additional experimental dog (the 30th) that displayed severe neurological disturbances.

In the 29 experimental dogs no significant changes were observed in the brain. Reactive cells and punctate hemorrhages were found in the subarachnoid space both in the experimental dogs and the controls. No substantial difference was observed in the two groups, nor was there a significant difference in the incidence of reactive cells and punctate hemorrhages at the different dose levels employed. Incipient granulomatous nodules were found in the arachnoid both in the experimental and the control dogs and frank granuloma in one experimental dog. Their significance was undetermined.

In the 30th animal, which had received the maximum dose (5.0 mg/kg), profound changes were observed in the brain. Their nature and distribution was such that head trauma might have been the cause.

MATERIALS

A total of 40 dogs was used in the experiment, 30 experimentals and 10 controls. Ten animals received (by stomach tube?) 0.05 mg/kg water condensate, another ten animals, 0.5 mg/kg, and the third ten animals, 5.0 mg/kg. All the dogs were sacrificed in approximately 6 months after start of the experiment. Sections from 29 animals were received from SRI for study. The sections had been obtained from (1) the frontal lobe, (2) the level of the hypothalamus, (3) the cerebellum, and (4) the pons. All these sections were stained by hematoxylin and eosin (H&E). In the 30th animal numerous sections were obtained from the nervous system. They were stained by H&E, luxol fast blue-PAS-hematoxylin and/or by silver methods.

FINDINGS IN THE 29 DOGS

0.05 mg/kg dose (Dogs C1-11 - C1-20)

Dog	Findings
C1-11	Leptomeninx: Slight activation of arachnoidal reticuloendothelial (RE) cells; striking meningeal fibrosis. Brain Okay.
C1-12	Leptomeninx: Slight RE-cell activation, rare punctate hemorrhages. Choroid plexus Okay. Brain Okay.
C1-13	Leptomeninx: Moderate RE-cell activation, no hemorrhage. Choroid plexus Okay. Brain Okay.
C1-14	Leptomeninx: No RE-cell activation, rare hemorrhage. Brain Okay.
C1-15	Leptomeninx Okay. Choroid plexus Okay. Brain Okay.
C1-16	Leptomeninx Okay. Brain: Sizable perivenous <u>punctate hemorrhages</u> in floor of 4th ventricle; brain otherwise Okay.
C1-17	Leptomeninx delicate throughout, minimal hemorrhage. Brain Okay.
C1-18	Leptomeninx: Slight fibrotic changes, otherwise Okay. Brain Okay.
C1-19	Leptomeninx: Same as for C1-18 except for a few scattered punctate hemorrhages in subarachnoid space. Meningeal fibrosis. Brain: Several sizable <u>punctate hemorrhages</u> in cerebellar white matter and pontine tegmentum.
C1-20	Leptomeninx: Obvious <u>granulomas</u> in cerebral meninges composed of epithelioid cells, some lymphoid cells, some large fibroblasts. No caseation. Similar changes elsewhere, but minor. Cerebrum, cerebellum, pons Okay.

0.5 mg/kg dose (Dogs C2-21 - C2-30)

Dog	Findings
C2-21	Small <u>granulomatous mass</u> in region of cerebral arachnoid membrane with proliferative changes in adjacent arachnoid membrane. Leptomeninx elsewhere Okay except for fibrosis. Brain Okay.
C2-22	Leptomeninx: Slight RE-cell activation; focal meningeal fibrosis. Choroid plexus Okay. Small perivascular collection of lymphoid cells in meninges of cerebellar sulcus. Brain Okay.
C2-23	Leptomeninx: Slight activation of RE cells, no hemorrhage. Brain Okay.
C2-24	Leptomeninx: Delicate. No hemorrhages. Brain Okay.
C2-25	Leptomeninx: <u>Focally hyperplastic arachnoid membrane</u> (cerebral). Brain Okay.
C2-26	All Okay.
C2-27	Leptomeninx: Moderate activation of RE cells. Brain Okay.
C2-28	Leptomeninx: Occasional subarachnoid hemorrhages, RE cells Okay. Strikingly hyperplastic arachnoid membrane (<u>granulomatous process?</u>) focally in cerebellar meninges. No change in brain.
C2-29	Leptomeninx: Moderate RE-cell activation. Copious epiarachnoid and subarachnoid hemorrhages. Brain: <u>Small punctate hemorrhage</u> in hypothalamus; brain otherwise Okay.
C2-30	Several <u>punctate hemorrhages</u> in hypothalamus. Brain otherwise Okay.

5.0 mg/kg dose (Dogs C3-31 - C3-40)

Dog	Findings
C3-31	Slightly activated arachnoidal RE cells; sparse punctate hemorrhages in cerebellar subarachnoid space. Choroid plexus Okay. Cerebral cortex, white matter, thalamus, striatum, pallidum, cerebellum, pons Okay. Blood vessels Okay.
C3-32	Occasional punctate subarachnoid hemorrhage, cerebellum. Brain Okay.
C3-33	See separate report.
C3-34	Leptomeninx: Numerous activated RE cells in arachnoid meshes; many punctate hemorrhages in subarachnoid space, especially in sulci; no leucocytes seen. Striking multifocal collagenous thickening of arachnoid trabecular connective tissue. Hypothalamus, cerebellum, pons Okay.
C3-35	Leptomeninx: Much the same as in C3-34. Small collection of lymphocytes around one meningeal vein. Mesothelial-cell aggregate (so-called <u>epithelial granulation</u>) in cerebral arachnoid membrane (normal in man and animals). Brain Okay.
C3-36	Leptomeninx: Much the same as in C3-31. Multifocal collagenous thickening of some choroid plexus fronds. Cerebral cortex, striatum, pallidum, thalamus, hypothalamus, pons Okay.
C3-37	Leptomeninx: Punctate hemorrhages and activated RE cells found here and there. Choroid plexus Okay. Striatum and thalamus: Nerve cell nuclei enormously ballooned and pale (artefact); no hypertrophied astrocytes seen.
C3-38	Leptomeninx: Prominent fibrous thickening of arachnoidal connective tissue at base of hypothalamus; otherwise Okay. Brain and pons Okay.
C3-39	Leptomeninx: Rare activation of RE cells. Much collagenous thickening of trabecular connective tissue. Choroid plexus Okay. Brain, pons, cerebellum Okay.
C3-40	Leptomeninx: Striking meningeal fibrosis. No activation of RE cells. No hemorrhage seen. Vessels Okay. Brain (including hippocampal formation) Okay. Cerebellum and pons Okay. <u>Saw one sizable punctate hemorrhage</u> in cerebrum but on reexamination could not locate it.

Controls (Dogs CO-01 - CO-10)

Brain: No change was observed in any animal.

Leptomeninx: Activated RE cells were found in 4 animals (CO-05, 06, 07, 08) but they were rather sparse. Scattered punctate hemorrhages were noted in 8 of the 10 animals. Frank hemorrhage was found in the 4th ventricle in CO-07, and in the choroid plexus of the 3rd ventricle in CO-10. Engorgement of vessels with blood (in CO-02 and CO-06) was noted but was not impressive. Meningeal fibrosis was observed in 4 animals (CO-01, 02, 04, 07). Focal hyperplasia (granulomatous process?) was noted in the arachnoid membrane of the cerebellum and cerebrum (in CO-04), also in the arachnoid membrane along surface of the fornix (in CO-10).

Comment

The cerebrum, cerebellum and pons in all the dogs appeared normal. No glial reaction was observed in any of the brains. Rare punctate hemorrhages were found in CNS tissue in 5 experimental dogs (C1-16, C1-19, C2-29, C2-30, C3-40) and in no controls. These hemorrhages were too few to be regarded as significant. There was frank hemorrhage in the 4th ventricle in one control dog (CO-07) and in the choroid plexus of the 3rd ventricle of another control dog (CO-10). These hemorrhages could have resulted from manipulation of the brain in the course of autopsy.

As to the leptomeninges, an effort was made to see if activated arachnoidal reticuloendothelial (RE) cells (histiocytes) were more frequent in the experimental dogs than in the controls. These cells, and also monocytic macrophages (from the bone marrow) which were also seen in the subarachnoid space, were difficult to quantitate. Both these cell types normally remove materials from the cerebrospinal fluid, and exhibit a slow turnover rate. Both are seen in increased number, for example, in certain local infections. The impression was gained that these cells were in greater number in the experimental animals as a group than in the controls as a group, but this is no more than an impression. Whether the toxic material given the animals was responsible for the difference, if it existed, is unknown. This is because of the possible operation of other factors such as visceral infection.

Punctate hemorrhages in the subarachnoid space were seen both in the experimental dogs and the controls (in 8 of 10 controls). Some of them could well be laid to the autopsy procedure. Thus there is no substantial evidence that the toxic material so adversely affected leptomeningeal blood vessels that hemorrhage occurred.

The meningeal fibrosis in the two groups of animals is regarded as an age-related change.

Of particular interest were the granulomatous nodules seen in the arachnoid in 3 experimental dogs (C1-20, C2-21, C2-28[?]) and in 2 control dogs (CO-04[?] and CO-10[?]). They originated from the arachnoid membrane. Only in one dog (experimental dog C1-20) were there frank arachnoid granulomas. Being present in the control dogs suggests a process (infectious?) inherent in this animal colony. All these so-called granulomas were very small. What they might signify is left open.

FINDINGS IN DOG C3-33

This dog obviously had severe neurological disturbances. Outstanding were thrashing movements of head and body, inability to stand, spasticity of the forelimbs and flaccidity of the hindlimbs, constant turning of the head from side to side (apparently involuntary), lack of control of head extensors, and apparent blindness of both eyes although the pupils reacted to light. Impression at that time: extrapyramidal syndrome, cerebellar component (?), dystonia musculorum, pyramidal tract involvement, blindness.

Sections were obtained from levels of the cerebrum, cerebellum, brainstem and spinal cord, also from the optic nerve, brachial plexus, oculomotor nerve, sciatic nerve, and sympathetic ganglionated chain. Sections were stained by hematoxylin-eosin and luxol fast blue-PAS-hematoxylin. Selected sections were stained by silver techniques.

The most outstanding change was a complete loss of the entire lenticular nucleus (putamen and globus pallidus) (a part of the wall is shown in Fig. 1) and substantia nigra (Fig. 2) bilaterally. These structures had earlier undergone total necrosis. All that remained in their stead was a filmy connective tissue framework. Silver-stained sections revealed striking astroglioses along the border of the now absent gray matter.

Small cavitations were found in the caudate nuclei. They were surrounded by a corona of much hypertrophied astrocytes (Figs. 3, 4 and 5).

The red nucleus appeared intact bilaterally.

The cerebral cortex was intact, but many of its pyramidal cells were atrophic. Myelin pallor was noted in the lower part of the cerebrum. The internal capsule, however, appeared normally myelinated, and the same was true for the medullary pyramids. However, the pyramidal tracts in the cervical cord were slightly demyelinated, but myelin loss was not detected at lower spinal cord levels. No changes were seen in nerve cells of the spinal cord. The part of the basis pedunculi next to devastated substantia nigra was somewhat coinvolved. This may be the explanation of the spasticity of the dog's forelimbs.

Aside from some myelin loss, the cerebellum showed no change.

In the pons unilaterally there was a large area in the region of the vestibular nuclei (and beyond) in which the tissue was "softened" and demyelinated. Collections of macrophages were found here and there in the lesion. A fair number of nerve cells in this region had disintegrated. A smaller lesion in the same position was noted on the other side of the pons. Possibly the damage incurred by the vestibular nuclei was responsible for the inability of the dog to maintain its balance in attempting to stand up from a prone position.

The optic nerve showed no evident demyelination. Silver preparations revealed suggestive astroglial hypertrophy all through the nerves. No change that could be considered significant was found in the lateral geniculate body or in visual cortex. Thus, whether the animal was actually blind was not substantiated, nor can blindness be refuted.

No change was observed in the brachial plexus, oculomotor nerve, sciatic nerve, or sympathetic ganglionated chain.

Comment

Considering the lack of brain changes in the other 9 dogs receiving the same dose, the odds are overwhelming that some factor other than the supposedly toxic substance given this animal was responsible. What that factor may be is conjectural. It is known that in humans much the same change occurs in the lenticular nucleus from an overdose of barbital or heroin or as a consequence of carbon monoxide poisoning. Practically the same neuropathological picture as observed in this dog has been reported in humans receiving severe head trauma. (Reference: Malamud and Haymaker: Cerebral trauma and extrapyramidal involvement, etc. J Neuropath Exp Neurol, 6:217-266, 1947.) It is therefore suggested that this dog thrashed about for some time after being given the substance, repeatedly striking its head on a hard surface. (No signs of old hemorrhage were, however, observed in the scalp at autopsy.)

The lesions in the brain in this animal were infarcts (e.g., see Fig. 3) considered to have been caused by cessation or severe reduction of blood flow to the now damaged structures. It is suggested that following head impact the brain became swollen (edematous) and that, being displaced medialward on the two sides, squeezed (1) the anterior choroidal arteries (originating from the circle of Willis), interrupting blood flow to the lenticular nucleus bilaterally, and (2) the posterior choroidal arteries (springing from the first part of the posterior cerebral artery), interrupting blood flow to the substantia nigra bilaterally. The same mechanism has been proposed as responsible for the corresponding lesions occurring in carbon monoxide poisoning, barbiturate poisoning, and from overdose of heroin.

Incl: Photographs

Webb Haymaker

Webb Haymaker, M.D.
Consulting Neuropathologist



FIGURE 1

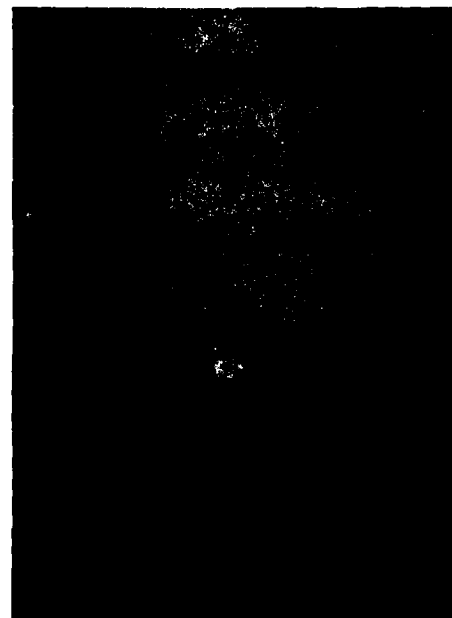


FIGURE 2

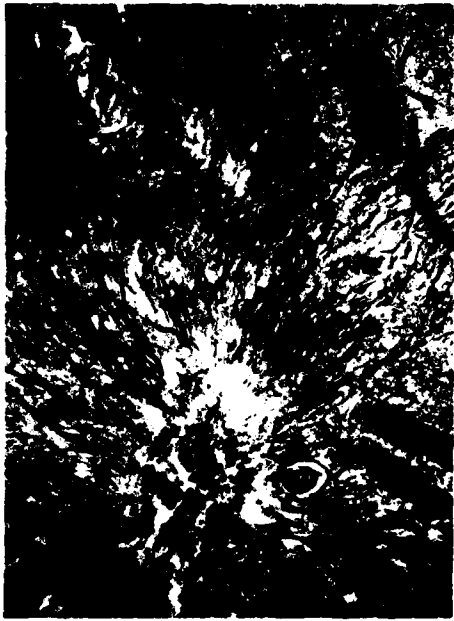


FIGURE 3

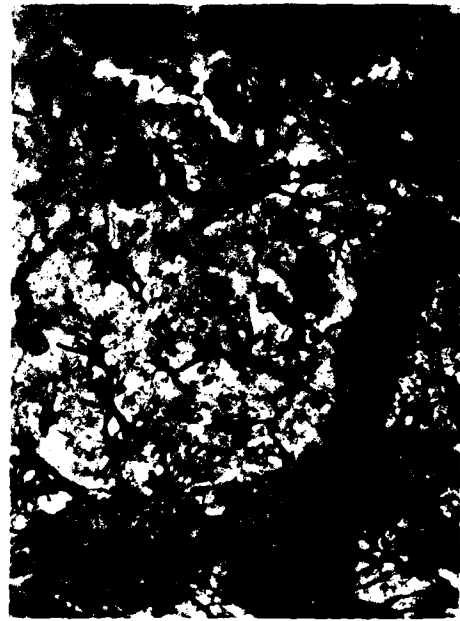


FIGURE 4

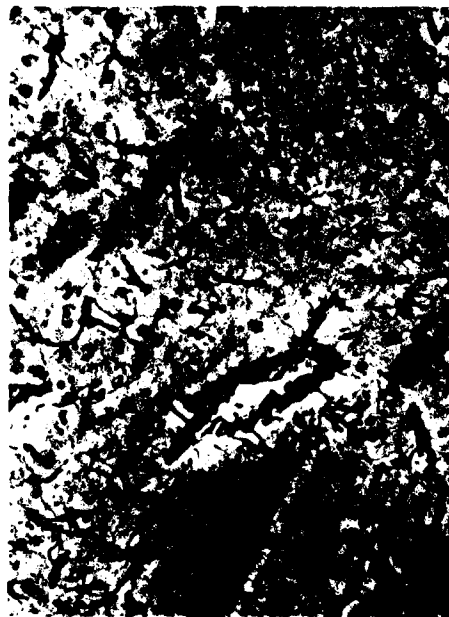


FIGURE 5

Appendix G

RANGE-FINDING STUDIES ON
CONDENSATE WATER MIXTURES

Four-week range-finding studies were conducted on the 17-component condensate water mixture (Table 1, Phase I tests) in dogs, rats, and mice and on the 30-component condensate water mixture (Table 1, Phase II tests) in rats and mice. Each group comprised one dog (male or female) and ten rats, and ten mice (5 of each sex). Dose levels and parameters measured are given in the headings to the tables. All animals were dosed in the manner described under Experimental Methods, Part 2, and all survivors were killed after 4 weeks of treatment.

Table G-1

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (KG)
OF MALE DOGS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
INITIAL	12.2	11.6	11.7	13.1	11.2	12.2
WEEK 1	11.8	11.1	11.3	12.8	10.0	
WEEK 2	11.9	11.1	11.2	12.6		
WEEK 3	11.8	11.2	11.0	12.6		
WEEK 4	11.6	11.7	11.5	13.1		

1 DOG IN EACH GROUP

Table G-2

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF MALE DOGS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
WEEK 1	254.4	177.8	204.2	136.8	22.0	116.5
WEEK 2	261.2	256.4	245.2	217.0		
WEEK 3	400.0	383.6	367.2	367.8		
WEEK 4	400.0	400.0	356.8	400.0		

Table G-3

HEMATOLOGY OF MALE DOGS BEFORE TREATMENT WITH CONDENSATE WATER

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
RBC ($\times 10^6$)	7.52	5.56	6.46	6.57	6.31	5.67
WBC ($\times 10^3$)	13.0	17.1	21.5	20.6	17.2	18.8
HGB (G %)	16.2	14.9	17.4	18.2	17.0	15.7
HCT (%)	50.3	38.4	46.1	47.4	43.6	39.0
MCV (U) ³	66	68	70	71	68	67
MCH (UUG)	21.3	26.8	26.2	27.3	27.0	28.1
MCH (Z)	62	63	61	55	54	63
BANDS (Z)	2	3	2	3	2	1
LYMPH (Z)	17	19	19	26	25	23
ATT. LYMPH (Z)	2	1	0	1	2	1
MONO (Z)	7	6	7	7	5	6
EOSIN (Z)	10	8	11	8	12	6
BAZO (Z)	0	0	0	0	0	0
RETICS (Z)	0.8	0.5	1.0	0.6	0.8	1.0

Table G-4

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE DOGS AFTER 2 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
RBC (X 10 ⁶)	6.4	6.5	7.1	5.5	4.87	6.0
WBC (X 10 ³)	15.0	11.6	12.8	15.5	29.0	26.4
HGB (G %) 2	15.4	16.9	18.5	14.7	13.1	16.6
HCT (%)	43	46	50	41	38	41
MCV (U) 3	68	70	71	76	77	67
MCH (MCG)	23.5	26	26	26	26.5	28
MCH (Z)	67	56	62	52	74	71
PLT (Z)	3	2	2	1	6	6
PLT (Z)	17	30	20	24	13	16
ATT. LYMPH (Z)	0	0	2	2		
MONO (Z)	5	5	6	6	5	6
EOSIN (Z)	8	7	8	15	2	1
BAZO (Z)	0	0	0	0	0	0
NEUTS (Z)	0.5	0.8	1.0	1.0	9.5	0.6

Table G-5

EFFECTS OF CONDENSED WATER ON HEMATOLOGY
OF MALE DOGS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
RBC (X 10 ⁶)	6.78	5.77	7.18	5.72		
WBC (X 10 ³)	10.3	10.2	12.4	13.3		
HGB (G %)	15.9	14.1	17.6	14.4		
HCT (%)	46.2	40.3	50.6	43.7		
MCV (U) ³	67	69	70	75		
MCH (UG)	23.3	24.4	24.4	25.1		
MCH (X)	63	61	61	49		
BAKDS (X)	0	0	0	1		
LYMPH (X)	13	20	26	30		
ATT. LYMPH (X)						
MONO (X)	6	10	5	5		
EOSIN (X)	18	9	8	15		
BAZO (X)	0	0	0	0		
RETICS (X)	0	0.2	0.4	1.6		

Table G-6

CLINICAL CHEMISTRY OF MALE DOGS BEFORE TREATMENT WITH CONDENSATE WATER

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
GLUCOSE (MG Z)	108	115	113	100	122	129
BUN (MG Z)	14	12	10	12	10	11
CREAT (MG Z)	0.9	0.7	0.9	1.0	1.0	0.9
P (MG Z)	6.6	6.8	6.7	6.9	7.0	6.2
TRIG (MG Z)						
BILI (MG Z)	1.0	0.8	0.9	1.0	0.7	0.4
SGOT (MU/ML)	24	18	19	25	18	22
SGPT (MU/ML)	26	35	33	30	21	27
LBN (MU/ML)	24	60	38	34	29	27
ALP (MU/ML)	56	64	53	67	61	50
CHOL (MG Z)	170	139	137	136	188	152
CA (MG Z)	12.0	12.1	11.2	12.3	11.3	11.2
URIC ACID (MG Z)	0.6	0.7	0.6	0.5	0.3	0.7
PROTEIN (GM Z)	5.8	5.8	5.9	6.0	5.7	5.9
ALBUMIN (GM Z)	4.0	4.0	3.9	4.5	4.0	4.1
GLOBULIN (GM Z)	1.8	1.8	2.0	1.5	1.7	1.8
A/C RATIO	2.2	2.2	1.9	3.0	2.3	2.2
NA (MEQ/L)						
K (MEQ/L)						
CO ₂ (MEQ/L)						
CL (MEQ/L)						
NA-(CL+CO ₂)						
IRON (MCG Z)						

Table G-7

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS AFTER 2 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/KG/DAY	1.0 MG/KG/DAY	5.0 MG/KG/DAY	25.0 MG/KG/DAY	125.0 MG/KG/DAY
GLUCOSE (MG %)	93	125	107	112	152	
BUN (MG %)	12	10	9	10	16	
CREAT (MG %)	1.1	1.1	1.0	1.2	0.9	
P (MG %)	5.4	5.2	5.6	5.3	4.7	
TRIC (MG %)	20	12	14	22	29	
BILI (MG %)	0.1	0.1	0.2	0.4	1.1	
SGOT (MU/ML)	43	34	35	45	62	
SGPT (MU/ML)	39	59	49	43	59	
LDB (MU/ML)	106	71	104	102	167	
ALK-P (MU/ML)	97	95	83	92	131	
CHOL (MG %)	155	125	141	135	245	
CA (MG %)	11.2	10.4	10.7	10.8	11.1	
URIC ACID (MG %)	0.2	0.2	0.2	0.2	0.5	
PROTEIN (GM %)	5.9	5.8	6.0	6.0	6.1	
ALBUMIN (GM %)	2.7	2.9	2.9	3.0	3.2	
GLOBULIN (GM %)	3.2	2.9	3.1	3.0	2.9	
A/C RATIO	0.84	1.0	0.94	1.0	1.1	
NA (MEQ/L)	147	144	145	145	148	
K (MEQ/L)	4.4	5.1	4.7	4.9	4.4	
CO ₂ (MEQ/L)	25	22	22	18	25	
CL (MEQ/L)	108	110	110	112	105	
NA-(CL+CO ₂)	14.0	12.0	13.0	15.0	18	
IRON (MCG %)	126	213	182	121	388	

Table G-8

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE DOGS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		0.2 MG/EG/DAY	1.0 MG/EG/DAY	5.0 MG/EG/DAY	25.0 MG/EG/DAY	125.0 MG/EG/DAY
GLUCOSE (MG %)	117	129	109	109		
BUN (MG %)	14	11	12	13		
CREAT (MG %)	0.6	0.8	0.9	0.9		
P (MG %)	5.4	4.9	5.9	5.3		
TRIG (MG %)	42	20	26	39		
BILI (MG %)	0.2	0.1	0.1	0.2		
SGOT (MU/ML)	45	30	34	48		
SGPT (MU/ML)	62	272	61	55		
LDR (MU/ML)	68	54	43	63		
ALR-P (MU/ML)	98	102	85	95		
CHOL (MG %)	147	124	148	161		
CA (MG %)	11.7	10.7	11.0	11.0		
URIC ACID (MG %)	0.3	0.2	0.2	0.2		
PROTEIN (GM %)	6.0	5.4	5.9	6.1		
ALBUMIN (GM %)	2.9	2.7	2.9	2.9		
GLOBULIN (GM %)	3.1	2.7	3.0	3.2		
A/G RATIO	0.94	1.0	0.97	0.91		
HA (MEQ/L)	146	145	146	145		
K (MEQ/L)	4.7	4.6	4.8	4.9		
CO ₂ (MEQ/L)	26	26	22	21		
CL (MEQ/L)	109	110	111	111		
HA-(CL+CO ₂)	11.0	9.0	13.0	13.0		
IRON (MCG %)	237	276	284	186		

Table G-9

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS							
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET	1 % IN DIET	5 % IN DIET
INITIAL	184.40± 16.3	182.00± 20.6	143.80± 15.6	179.20± 16.3	205.40± 5.56	194.40± 6.87	174.20± 17.8		
WEEK 1	231.60± 10.2	247.20± 19.6	216.20± 11.6	235.80± 12.9	251.80± 8.77	233.60± 9.00	131.25± 3.68 *		
WEEK 2	270.60± 8.41	298.80± 15.5	275.20± 7.61	283.40± 11.9	293.40± 11.9	251.00± 10.6	100.00± 3.00**		
WEEK 3	296.40± 8.01	335.40± 10.7	319.20± 9.62	314.60± 12.2	316.40± 13.2	263.60± 15.1			
WEEK 4	305.60± 8.47	343.40± 8.59	330.20± 12.5	321.00± 13.2	320.20± 14.2	263.40± 12.7			

ENTRIES ARE MEANS AND STANDARD ERRORS

5 ANIMALS PER GROUP

* 1 ANIMAL DIED

** 4 ANIMALS DIED

Table G-10

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
INITIAL	192.20± 3.46	195.00± 4.66	181.80± 1.24	189.60± 2.06	183.20± 4.40	168.40± 5.61	186.20± 4.79
WEEK 1	211.30± 4.68	216.40± 4.78	193.40± 8.41	199.60± 3.71	192.20± 7.36	172.00± 6.69	153.40± 4.07
WEEK 2	225.40± 6.45	229.80± 4.25	203.20± 8.00	211.00± 3.58	202.20± 7.23	176.20± 8.00	115.00± 5.28**
WEEK 3	234.60± 7.97	244.60± 4.01	211.00± 6.28	216.20± 4.72	205.80± 6.98	174.20± 7.66	102.00± 0.00 *
WEEK 4	232.20± 9.33	238.60± 4.84	202.00± 5.59	212.00± 4.67	198.00± 7.52	164.80± 8.24	

ENTRIES ARE MEANS AND STANDARD ERRORS

5 ANIMALS PER GROUP

** 3 ANIMALS DIED

* 2 ANIMALS DIED

Table G-11

EFFECTS OF CONDENSED WATER ON FOOD CONSUMPTION
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET
WEEK 1	20.4	23.1	22.3	23.8	20.5	18.0
WEEK 2	29.7	24.7	24.5	24.2	22.7	16.1
WEEK 3	22.9	26.1	26.1	24.8	23.9	18.4
WEEK 4	24.4	23.5	23.9	23.8	21.9	21.9
						1.6
						.8
						1.6
						21.9

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-12

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.5 % IN DIET
WEEK 1	18.9	17.5	15.0	16.3	13.9	2.2
WEEK 2	17.7	16.7	14.7	15.5	14.5	2.1
WEEK 3	19.3	18.0	16.0	16.3	15.4	1.2
WEEK 4	18.1	15.5	14.1	14.7	14.2	8.2

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-13
EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G).
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
BRAIN	2.16± .07	2.10± .04	2.14± .07	1.92± .08	2.08± .04	1.96± .02	2.10± 0.00
HEART	1.34± .04	1.24± .06	1.38± .06	1.30± .08	1.28± .05	1.06± .05	.90± 0.00
LIVER	10.20± .44	11.32± .29	11.22± .49	11.46± .78	13.00± .55	11.28± .83	3.10± 0.00
SPLEEN	.62± .02	.84± .10	.82± .13	.76± .05	1.70± .21	1.74± .09	.30± 0.00
KIDNEYS	2.74± .23	2.84± .09	2.96± .13	3.14± .31	2.92± .18	2.60± .13	1.10± 0.00
TESTES	2.98± .15	2.98± .12	3.18± .04	2.94± .13	1.14± .06	1.08± .04	1.20± 0.00
BRAIN/BODY WT.	7.09± .32	6.12± .14	6.50± .25	6.01± .30	6.54± .26	7.51± .37	
HEART/BODY WT.	4.40± .19	3.60± .11	4.19± .14	4.09± .36	4.00± .07	4.03± .08	
LIVER/BODY WT.	33.35± .80	32.99± .65	33.97± .60	35.54± 1.03	40.74± 1.65	42.65± 1.53	
SPLEEN/BODY WT.	2.04± .09	2.44± .28	2.46± .34	2.36± .11	5.34± .70	6.62± .22	
KIDNEYS/BODY WT.	8.92± .53	8.27± .15	8.97± .26	9.70± .60	9.13± .47	9.89± .35	
TESTES/BODY WT.	9.73± .25	8.67± .20	9.70± .44	9.18± .30	3.58± .22	4.17± .36	
HEART/BRAIN	.62± .01	.59± .03	.65± .03	.68± .03	.62± .02	.54± .03	.43± 0.00
LIVER/BRAIN	4.73± .20	5.39± .11	5.26± .25	6.00± .46	6.24± .20	5.76± .43	1.48± 0.00
SPLEEN/BRAIN	.29± .02	.40± .05	.38± .06	.40± .03	.82± .11	.89± .05	.14± 0.00
KIDNEYS/BRAIN	1.27± .09	1.35± .04	1.39± .06	1.63± .14	1.40± .07	1.33± .07	.52± 0.00
TESTES/BRAIN	1.38± .07	1.42± .06	1.49± .07	1.54± .08	.55± .03	.55± .02	.57± 0.00

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-14
EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G),
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
BRAIN	2.06± .02	2.10± .05	2.00± .03	1.86± .08	1.94± .02	1.88± .02	2.05± .15
HEART	1.08± .07	1.00± .04	.94± .05	.82± .02	.90± .03	.70± .03	.40± 0.00
LIVER	6.96± .30	6.86± .40	5.80± .27	6.42± .21	6.46± .34	6.00± .48	3.00± .20
SPLEEN	.62± .07	.62± .02	.48± .02	.54± .05	.88± .10	.82± .10	.45± .05
KIDNEYS	1.78± .09	1.88± .07	1.64± .05	1.72± .07	1.62± .07	1.50± .13	1.50± .10
BRAIN/BODY WT.	8.92± .34	8.82± .29	9.95± .43	8.80± .46	9.84± .29	11.51± .51	
HEART/BODY WT.	4.65± .20	4.18± .12	4.68± .34	3.88± .13	4.56± .20	4.26± .14	
LIVER/BODY WT.	29.99± .68	28.67± 1.18	28.72± 1.12	30.31± .98	32.58± .72	36.22± 1.25	
SPLEEN/BODY WT.	2.64± .20	2.60± .09	2.39± .14	2.56± .27	4.44± .48	4.93± .45	
KIDNEYS/BODY WT.	7.67± .23	7.88± .22	8.16± .42	8.11± .27	8.18± .14	9.10± .62	
HEART/BRAIN	.52± .03	.48± .02	.47± .03	.45± .03	.46± .01	.37± .01	.20± .01
LIVER/BRAIN	3.38± .15	3.28± .21	2.91± .18	3.49± .23	3.33± .15	3.19± .24	1.48± .21
SPLEEN/BRAIN	.30± .03	.30± .01	.24± .01	.30± .04	.45± .05	.44± .05	.22± .01
KIDNEYS/BRAIN	.86± .04	.90± .04	.82± .03	.93± .06	.83± .03	.80± .06	.73± .00

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-15

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
RBC (X 10 ⁶)	7.67± .09	7.70± .13	7.20± .21	7.68± .06	6.70± .30	6.09± .14	
HGB (G %)	14.70± .20	15.22± .33	14.12± .30	14.50± .18	14.38± .20	13.70± .34	
HCT (X)	41.92± .51	43.24± .91	40.74± .81	41.72± .53	42.40± .57	39.42± .94	
MCV (U) ³	54.60± .87	55.80± 1.11	56.20± .58	54.00± .71	63.00± 2.35	64.00± 1.38	
MCH (MCG)	19.10± .33	19.66± .40	19.54± .15	18.80± .25	21.45± .88	22.38± .37	
MCHC (X)	35.16± .07	35.24± .13	34.74± .18	34.84± .09	33.95± .30	34.82± .35	
WBC (X 10 ³)	9.96± 1.37	12.22± 1.26	13.46± 1.12	15.98± 1.43	25.90± 0.00	27.35± 4.39	
PMN (X)	13.80± 4.21	17.60± 2.64	15.80± 2.52	12.20± .58	8.25± 1.70	8.60± 1.33	
BASO (X)	0.00± 0.00	.20± .20	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	
LYMPH (X)	83.60± 3.68	80.40± 2.62	80.80± 2.40	86.60± .60	90.50± 1.66	90.80± 1.43	
MONO (X)	1.60± .51	1.80± .49	1.20± .58	.80± .37	.50± .29	.20± .20	
EOSIN (X)	.60± .60	0.00± 0.00	.60± .40	.40± .24	.75± .48	.40± .40	
PLAS (X)	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	
RETICS (X)	.52± .17	.78± .15	.72± .22	.98± .26	3.75± .94	7.02± 1.67	

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-16

EFFECTS OF CONDENSATE WATER ON NEPHATOLOGY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET
RBC (X 10 ⁶)	7.84± .08	7.86± .19	8.13± .12	7.74± .16	6.74± .21	6.43± .24
WBC (G X)	14.50± .11	14.96± .28	14.84± .24	14.84± .22	13.64± .28	13.86± .32
MCV (X)	42.08± .44	43.00± .83	43.76± .69	43.98± .71	41.70± .66	40.42± .71
MCV (W) ³	53.40± .75	54.40± .68	55.00± .32	56.40± .75	61.40± .98	62.40± 1.63
MCH (WBC)	18.40± .24	18.94± .28	18.16± .18	19.12± .38	20.22± .45	21.54± .54
MCHC (X)	34.58± .20	34.82± .14	34.34± .11	33.82± .18	32.82± .28	34.34± .42
WBC (X 10 ³)	9.36± .81	15.86± .90	10.42± 1.59	13.26± .78	21.02± 1.91	22.00± 0.00
PHB (X)	17.60± .75	10.20± 1.56	10.80± 1.62	10.20± 1.28	8.40± 1.63	9.80± 1.77
BANDS (X)	.20± .20	.80± .37	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00
LYMPH (X)	81.80± .49	87.60± 1.96	86.40± 2.25	87.00± 1.87	88.60± 2.56	87.20± 1.88
MONO (X)	.20± .20	.80± .58	2.00± 1.05	2.40± .93	2.60± 1.21	1.60± .51
EOSIN (X)	.20± .20	.60± .24	.80± .37	.40± .24	.40± .24	1.40± .40
PLAS (X)	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00
RETICS (X)	.64± .40	.28± .08	.34± .18	.34± .22	2.08± .21	1.80± .48

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-17

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
GLUCOSE (MG %)	110.80± 6.37	106.00± 7.05	107.40± 7.65	113.20± 8.84	138.40± 4.98	122.60± 8.09	
BUN (MG %)	16.80± 1.07	19.40± 1.91	17.00± 1.22	17.20± 1.36	17.80± .80	15.80± .97	
CREAT (MG %)	.66± .02	.50± 0.00	.60± 0.00	.56± .02	.58± .04	.46± .02	
URIC ACID (MG %)	1.92± .12	2.06± .16	1.76± .12	2.10± .11	2.60± .13	1.80± .19	
HA (MEQ/L)	140.20± .58	139.60± .93	141.00± .32	140.00± .32	141.80± .58	140.60± .81	
K (MEQ/L)	4.30± .29	4.56± .09	4.70± .09	5.16± .07	5.24± .16	5.32± .32	
CO ₂ (MEQ/L)	26.20± .80	26.80± .97	29.20± .58	26.60± 1.40	25.40± .51	26.60± .60	
CL (MEQ/L)	97.60± .68	99.20± .58	99.20± .37	97.80± 1.53	98.40± .51	98.80± .66	
CA (MG %)	10.08± .07	10.30± .15	10.42± .19	10.08± .09	10.46± .19	9.96± .14	
P (MG %)	8.06± .26	8.28± .15	8.72± .31	7.94± .14	8.40± .27	7.74± .25	
HA-(CL+CO ₂)	16.40± .81	13.60± .40	12.60± .51	15.60± .24	18.00± .32	12.03± 3.02	
CHOL (MG %)	52.20± 2.85	43.40± 1.03	51.00± 2.45	46.00± .55	57.60± 2.99	45.60± 1.72	
TRIG (MG %)	26.80± 4.89	38.00± 8.27	33.60± 9.69	56.00± 9.87	59.80± 8.83	46.00± 4.83	
BILI (MG %)	.14± .02	.18± .02	.20± .00	.20± .00	.20± .03	.20± .00	
SGOT (MU/ML)	171.20± 13.4	184.80± 5.54	157.40± 14.1	153.20± 4.42	176.60± 16.7	135.20± 8.14	
SGPT (MU/ML)	55.20± 2.08	49.60± 3.46	44.80± 2.78	35.80± 4.02	72.00± 16.0	40.80± 5.51	
LBN (MU/ML)	2589.00± 209.	2747.00± 244.	2383.40± 134.	2510.20± 96.4	2130.80± 228.	1688.20± 166.	
ALK-P (MU/ML)	303.00± 41.0	291.60± 13.8	327.60± 32.4	253.40± 10.7	215.00± 21.2	217.00± 19.2	
IRON (MCG %)	134.80± 10.8	176.20± 13.6	162.00± 27.6	179.60± 39.9	236.40± 43.4	164.80± 9.00	
PROTEIN (GM %)	6.14± .09	6.12± .18	6.00± .06	5.86± .08	5.80± .11	5.70± .10	
ALBUMIN (GM %)	3.16± .07	3.14± .07	2.98± .09	2.94± .05	2.86± .04	2.70± .09	
GLOBULIN (GM %)	2.98± .04	2.98± .14	3.02± .07	2.92± .09	2.94± .09	3.00± .13	
A/C RATIO	1.06± .02	1.06± .05	.99± .05	1.01± .04	.98± .03	.91± .06	

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-18

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS							
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET	1 % IN DIET	5 % IN DIET
GLUCOSE (MG %)	93.00± 3.99	96.40± 5.71	107.20± 12.5	105.00± 4.66	117.80± 12.1	123.50± 12.5			
BUN (MG %)	18.40± 1.29	18.40± .87	17.60± .81	18.60± 1.03	18.80± 1.53	15.50± 3.50			
CREAT (MG %)	.46± .02	.60± .03	.66± .02	.60± 0.00	.48± .02	.50± 0.00			
URIC ACID (MG %)	2.22± .45	2.02± .16	2.30± .38	2.32± .26	2.52± .22	1.65± .25			
NA (MEQ/L)	140.20± .73	138.60± .24	139.80± .97	139.80± .37	140.60± .40	139.50± 3.50			
K (MEQ/L)	4.82± .43	4.88± .23	4.98± .16	4.82± .12	4.98± .14	5.20± .20			
CO ₂ (MEQ/L)	23.60± .98	23.20± 1.83	22.80± .97	23.60± .68	22.80± .73	24.00± 3.00			
CL (MEQ/L)	98.40± .81	100.60± 1.40	102.60± .81	99.20± .58	100.20± .73	101.50± 1.50			
CA (MG %)	10.32± .11	10.14± .16	10.08± .23	10.54± .11	10.34± .11	9.65± .55			
P (MG %)	7.46± .17	7.84± .17	7.20± .23	7.44± .07	6.82± .14	7.15± .05			
NA-(CL+CO ₂)	18.20± 1.16	14.80± .80	14.40± .93	17.00± 1.38	17.60± .40	14.00± 2.00			
CHOL (MG %)	68.80± 4.35	70.40± 7.15	57.60± 4.20	74.80± 3.06	64.60± 4.08	72.00± 7.00			
TRIG (MG %)	17.20± 1.98	20.00± 7.60	14.00± 4.49	26.40± 8.54	28.40± 6.15	34.00± 15.0			
BILI (MG %)	.18± .02	.20± .00	.20± .00	.18± .02	.24± .02	.20± 0.00			
SGOT (MU/ML)	166.60± 21.3	181.80± 16.4	181.40± 17.2	142.00± 5.54	136.20± 7.40	120.50± 7.50			
SGPT (MU/ML)	49.80± 5.80	49.20± 8.05	30.00± 2.10	33.80± 2.82	33.00± 4.89	31.50± 3.50			
LDH (MU/ML)	2444.00± 97.1	2210.00± 193.	2662.80± 173.	1998.50± 427.	1629.60± 230.	1270.50± 209.			
ALK-P (MU/ML)	141.60± 23.8	148.20± 7.98	96.00± 20.7	108.40± 10.8	104.20± 24.5	97.50± 14.5			
IRON (MCG %)	296.20± 38.3	341.00± 22.3	271.00± 23.3	293.40± 25.4	284.40± 20.8	196.00± 3.00			
PROTEIN (GM %)	6.84± .07	6.42± .06	6.18± .16	6.68± .12	6.22± .12	5.50± .30			
ALBUMIN (GM %)	3.32± .09	3.22± .07	3.24± .11	3.56± .07	3.12± .09	2.75± .15			
GLOBULIN (GM %)	3.52± .06	3.20± .12	2.94± .06	3.12± .11	3.10± .09	2.75± .15			
A/G RATIO	.95± .04	1.02± .06	1.10± .03	1.15± .04	1.01± .04	1.00± 0.00			

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-19
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS							
		.001 X IN DIET	.005 X IN DIET	.01 X IN DIET	.05 X IN DIET	.1 X IN DIET	.5 X IN DIET	1.0 X IN DIET	2.0 X IN DIET
INITIAL	26.20± 1.28	21.60± 2.29	24.60± 1.83	27.20± 1.07	20.20± .49	26.40± 1.17	25.60± .87		
WEEK 1	28.80± 1.07	26.40± .98	28.80± 1.11	30.20± 1.11	25.60± 1.21	28.40± .93	19.00± 0.00 *		
WEEK 2	30.20± .97	26.20± .92	32.20± .86	32.20± 1.59	29.80± 1.62	29.40± .81	17.00± 0.00 *		
WEEK 3	32.00± .63	27.00± .84	33.40± .93	33.00± 1.79	31.80± 1.62	29.20± 1.16	14.00± 0.00 *		
WEEK 4	34.80± .58	28.60± .98	36.60± 1.03	37.80± .58	34.80± 1.32	31.40± 1.36			

ENTRIES ARE MEANS AND STANDARD ERRORS

5 ANIMALS PER GROUP

* 1 ANIMAL DIED

+ 2 ANIMALS DIED

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MAMMALIAN TOXICOLOGICAL EVALUATIONS OF TNT WASTEWATERS. VOLUME --ETC(U)

APR 79 J V DILLEY, C A TYSON, G W NEWELL

DAMD17-76-C-6050

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Table G-20
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
INITIAL	21.20± .80	23.80± 1.07	24.80± .37	22.80± .92	23.00± .84	21.80± .86	24.40± 1.17
WEEK 1	23.00± .89	25.00± .89	25.80± .37	24.80± 1.36	24.20± 1.16	22.00± 1.34	18.75± .95 *
WEEK 2	23.80± 1.07	25.00± .95	26.60± .60	25.20± 1.24	24.20± 1.33	21.20± 1.39	15.00± 0.00**
WEEK 3	24.20± 1.11	24.60± 1.99	27.60± .68	27.00± 1.22	26.20± 1.69	21.40± 1.54	14.00± 0.00 *
WEEK 4	25.80± 1.20	26.80± 1.28	29.40± .51	29.00± 1.36	27.60± 1.32	23.00± 2.19	

ENTRIES ARE MEANS AND STANDARD ERRORS

5 ANIMALS PER GROUP

* 1 ANIMAL DIED

** 3 ANIMALS DIED

Table G-21

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.5 % IN DIET
WEEK 1	4.7	4.5	5.1	4.4	4.5	4.1
WEEK 2	4.6	4.3	5.2	4.9	4.9	4.2
WEEK 3	5.0	4.6	5.3	5.0	5.1	3.8
WEEK 4	5.3	4.8	5.6	5.0	5.4	4.3

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-22

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET
WEEK 1	3.5	3.7	4.0	3.9	3.6	2.8
WEEK 2	3.7	4.1	4.3	4.1	3.7	2.7
WEEK 3	3.9	3.6	4.3	4.4	3.9	2.7
WEEK 4	4.0	4.5	4.6	4.5	4.1	3.1
						2.1
						1.5
						1.0

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-23

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G),
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS							
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET	1 % IN DIET	5 % IN DIET
BRAIN	.52±.02	.49±.01	.51±.01	.51±.01	.49±.01	.48±.01	.48±.03		
HEART	.27±.02	.20±.02	.26±.02	.22±.04	.21±.02	.18±.01	.18±.01		
LIVER	2.36±.08	1.71±.08	2.46±.12	2.37±.18	2.48±.11	2.13±.12	2.13±.12		
SPLEEN	.15±.02	.08±.00	.14±.01	.12±.02	.19±.02	.20±.03	.20±.03		
KIDNEYS	.62±.01	.53±.01	.68±.04	.59±.03	.70±.03	.49±.02	.49±.02		
TESTES	.26±.01	.21±.02	.23±.01	.23±.01	.11±.00	.09±.01	.09±.01		
BRAIN/BODY WT.	14.90±.79	16.98±.50	13.98±.51	13.55±.18	14.08±.52	15.19±.70	15.19±.70		
HEART/BODY WT.	7.67±.68	7.20±.78	7.08±.36	5.73±.1.04	6.07±.63	5.68±.35	5.68±.35		
LIVER/BODY WT.	67.97±2.78	59.81±1.88	67.08±1.69	62.55±4.60	71.38±1.85	67.76±1.61	67.76±1.61		
SPLEEN/BODY WT.	4.42±.42	2.81±.13	3.71±.20	3.27±.42	5.33±.45	6.22±.67	6.22±.67		
KIDNEYS/BODY WT.	17.90±.41	18.65±.38	18.61±.90	15.62±.84	20.10±.67	15.74±.51	15.74±.51		
TESTES/BODY WT.	7.38±.49	7.41±.51	6.95±.24	6.02±.31	3.27±.16	2.93±.21	2.93±.21		
HEART/BRAIN	.52±.04	.42±.04	.51±.04	.43±.08	.43±.04	.38±.04	.38±.04		
LIVER/BRAIN	4.58±.15	3.53±.14	4.84±.28	4.61±.33	5.10±.24	4.51±.28	4.51±.28		
SPLEEN/BRAIN	.30±.02	.17±.01	.27±.01	.24±.03	.38±.04	.42±.06	.42±.06		
KIDNEYS/BRAIN	1.21±.05	1.10±.02	1.34±.07	1.15±.06	1.43±.04	1.05±.06	1.05±.06		
TESTES/BRAIN	.50±.03	.44±.03	.50±.01	.44±.02	.23±.00	.19±.01	.19±.01		

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-24

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G).
ORGAN-TO-BODY WEIGHT RATIOS (1000G/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
BRAIN	.52± .01	.48± .01	.53± .02	.49± .02	.47± .01	.47± .01	
HEART	.16± .02	.16± .01	.16± .01	.15± .01	.15± .01	.15± .02	
LIVER	1.48± .07	1.64± .13	1.86± .10	1.70± .12	1.71± .06	1.66± .15	
SPLEEN	.12± .01	.12± .02	.13± .01	.15± .01	.19± .01	.18± .03	
KIDNEYS	.34± .03	.37± .03	.43± .03	.40± .01	.34± .01	.31± .02	
BRAIN/BODY WT.	20.41± 1.07	18.24± 1.02	17.91± .73	17.24± 1.19	16.88± .74	21.32± 1.90	
HEART/BODY WT.	6.08± .35	6.20± .51	5.37± .14	5.31± .47	5.47± .16	6.47± .23	
LIVER/BODY WT.	57.24± 1.48	60.92± 2.68	63.14± 3.04	59.50± 5.39	61.72± 1.33	72.54± 2.55	
SPLEEN/BODY WT.	4.56± .38	4.27± .65	4.49± .31	5.15± .41	6.88± .36	7.55± .69	
KIDNEYS/BODY WT.	13.20± .88	13.73± .78	14.47± 1.03	14.00± .77	12.26± .25	13.91± .90	
HEART/BRAIN	.30± .03	.34± .02	.30± .01	.31± .02	.33± .02	.32± .04	
LIVER/BRAIN	2.84± .17	3.40± .28	3.52± .07	3.44± .20	3.67± .09	3.50± .28	
SPLEEN/BRAIN	.23± .03	.24± .04	.25± .02	.30± .01	.41± .02	.37± .05	
KIDNEYS/BRAIN	.65± .04	.76± .05	.81± .05	.82± .01	.73± .02	.66± .03	

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-25

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS				
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET
RBC ($\times 10^6$)	8.20± .10	8.53± .17	8.20± .14	7.67± .19	7.15± .11	7.08± .21
MCB (C Z)	14.95± .25	15.48± .32	14.77± .33	14.15± .36	14.27± .38	13.12± .36
MCT (Z)	43.13± .72	45.06± .83	41.92± .88	41.20± 1.26	38.87± 1.16	39.20± .49
MCV (U) ³	50.75± 1.89	50.40± .40	48.50± .29	51.25± .95	52.33± .67	51.40± 1.12
MCH (MCG)	18.27± .46	18.20± .14	18.00± .18	18.45± .37	19.97± .53	18.73± .47
MCHC (Z)	35.47± .38	35.18± .34	36.10± .25	35.05± .45	37.43± .19	34.82± .84
WBC ($\times 10^3$)	9.40± 1.19	8.88± .91	8.02± .93	10.63± .54	9.03± 1.40	12.32± 1.77
PMN (Z)	25.00± 4.49	27.40± 4.52	20.50± 1.85	21.50± 2.02	20.67± 2.40	19.00± 4.81
BARBS (Z)	.75± .48	3.20± 1.53	.25± .25	0.00± 0.00	0.00± 0.00	0.00± 0.00
LYMPH (Z)	72.25± 4.89	68.80± 4.39	78.25± 1.60	77.25± 2.02	78.67± 2.19	80.00± 4.69
MONO (Z)	1.75± 1.03	.20± .20	.50± .50	.75± .25	.67± .33	.60± .40
EOSIN (Z)	.25± .25	.40± .24	.50± .50	.50± .29	0.00± 0.00	.40± .24
BAZO (Z)	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00
RETICS (Z)	1.53± .73	2.14± .47	1.15± .23	2.88± .54	4.77± 1.25	6.44± .69

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-26

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLES	CONTROL GROUP	TREATMENT GROUPS					
		.001 % IN DIET	.005 % IN DIET	.01 % IN DIET	.05 % IN DIET	.1 % IN DIET	.5 % IN DIET
RBC ($\times 10^6$)	8.46 \pm .29	8.34 \pm .22	7.99 \pm .17	8.31 \pm .26	7.96 \pm .16	7.95 \pm .26	
HGB (G %)	15.32 \pm .61	15.02 \pm .26	15.07 \pm .28	15.58 \pm .43	15.48 \pm .22	14.48 \pm .33	
HCT (%)	45.52 \pm 1.05	44.22 \pm 1.74	43.42 \pm .74	45.87 \pm 1.55	45.30 \pm .93	43.15 \pm 2.11	
HCV (W %)	49.40 \pm .40	49.40 \pm .68	51.50 \pm .29	51.50 \pm .65	53.40 \pm .81	50.50 \pm .50	
MCH (PG)	18.16 \pm .21	18.10 \pm .24	18.87 \pm .10	18.72 \pm .22	19.46 \pm .35	18.20 \pm .45	
MCHC (G %)	34.82 \pm .61	35.20 \pm .68	35.47 \pm .29	34.90 \pm .51	35.08 \pm .93	34.65 \pm 1.25	
WBC ($\times 10^3$)	4.78 \pm 1.02	9.14 \pm .54	9.60 \pm .56	9.95 \pm .58	11.38 \pm 1.17	13.13 \pm 2.86	
PMN (%)	19.20 \pm .37	15.60 \pm 3.33	14.50 \pm 3.88	16.25 \pm 2.39	14.00 \pm 2.66	19.75 \pm 3.04	
BARPS (%)	0.00 \pm 0.00	0.00 \pm 0.00	.50 \pm .50	0.00 \pm 0.00	0.00 \pm 0.00	0.00 \pm 0.00	
LYMPH (%)	79.40 \pm .68	83.00 \pm 3.24	84.00 \pm 3.67	83.00 \pm 2.35	84.00 \pm 2.83	78.25 \pm 3.82	
MONO (%)	1.40 \pm .75	1.00 \pm .32	.75 \pm .48	.50 \pm .29	1.60 \pm .60	1.75 \pm .85	
EOSIN (%)	0.00 \pm 0.00	.40 \pm .24	.25 \pm .25	.25 \pm .25	.40 \pm .40	.25 \pm .25	
PLAS (%)	0.00 \pm 0.00	0.00 \pm 0.00	0.00 \pm 0.00	0.00 \pm 0.00	0.00 \pm 0.00	0.00 \pm 0.00	
RETICS (%)	1.36 \pm .35	2.74 \pm .62	2.42 \pm .31	1.83 \pm .23	3.76 \pm 1.06	3.25 \pm 1.06	

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-27
EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALES RATS DURING 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.1 % IN DIET
INITIAL	223.60 ± 4.27	215.00 ± 8.31	216.80 ± 4.36	211.20 ± 6.82
WEEK 1	273.60 ± 6.62	269.20 ± 9.90	266.40 ± 5.66	230.20 ± 7.92
WEEK 2	315.40 ± 5.64	315.40 ± 12.8	307.60 ± 7.24	250.40 ± 7.35
WEEK 3	354.20 ± 5.78	355.00 ± 15.7	342.80 ± 9.91	266.80 ± 9.37
WEEK 4	375.40 ± 6.31	371.60 ± 17.0	364.00 ± 11.6	272.00 ± 10.4

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-28

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.1 % IN DIET
INITIAL	178.80 ± 4.41	178.00 ± 1.38	177.60 ± 3.49	183.60 ± 1.91
WEEK 1	197.40 ± 5.80	193.00 ± 2.88	184.00 ± 5.21	178.20 ± 2.42
WEEK 2	209.40 ± 6.63	207.80 ± 3.61	194.40 ± 5.71	183.40 ± 3.93
WEEK 3	218.00 ± 6.26	220.20 ± 3.35	204.20 ± 4.36	190.40 ± 4.55
WEEK 4	230.40 ± 7.72	233.80 ± 4.09	219.20 ± 6.18	200.00 ± 6.48

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-29

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF MALE RATS DURING 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.1 % IN DIET
WEEK 1	23.63	23.51	22.89	18.32
WEEK 2	26.66	26.26	26.08	18.06
WEEK 3	27.66	28.43	26.14	18.72
WEEK 4	27.51	27.11	27.72	19.12

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-30

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF FEMALE RATS DURING 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS	
		.001 % IN DIET	.01 % IN DIET
WEEK 1	16.60	17.57	12.83
WEEK 2	17.26	19.26	17.68
WEEK 3	17.26	26.49	17.26
WEEK 4	16.60	17.65	16.60
			12.14
			10.57
			11.88
			11.83

UNITS ARE: GRAMS/ANIMAL/DAY

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (100XG/C) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/C)
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS	
		.001 % IN DIET	.01 % IN DIET
BRAIN	2.05 ± .04	2.03 ± .04	2.10 ± .03
HEART	1.45 ± .10	1.55 ± .14	1.39 ± .03
LIVER	16.75 ± .79	15.41 ± 1.15	17.68 ± .63
SPLEEN	.73 ± .01	.76 ± .04	.92 ± .07
KIDNEYS	3.10 ± .13	2.96 ± .09	3.42 ± .11
TESTES	3.21 ± .09	2.97 ± .12	3.13 ± .04
BRAIN/BODY	5.46 ± .12	5.54 ± .36	5.80 ± .14
HEART/BODY	3.86 ± .30	4.18 ± .33	3.83 ± .13
LIVER/BODY	44.57 ± 1.63	41.41 ± 2.05	48.61 ± 1.30
SPLEEN/BODY	1.95 ± .03	2.06 ± .10	2.52 ± .16
KIDNEYS/BODY	8.28 ± .40	8.01 ± .26	9.43 ± .34
TESTES/BODY	8.56 ± .32	8.10 ± .60	8.66 ± .36
HEART/BRAIN	.70 ± .04	.77 ± .08	.66 ± .02
LIVER/BRAIN	8.20 ± .47	7.58 ± .55	8.39 ± .20
SPLEEN/BRAIN	.36 ± .01	.38 ± .02	.44 ± .03
KIDNEYS/BRAIN	1.51 ± .04	1.46 ± .05	1.63 ± .04
TESTES/BRAIN	1.57 ± .04	1.46 ± .05	1.49 ± .03

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-32

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO BRAIN WEIGHT RATIOS (G/G)
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.1 % IN DIET
BRAIN	1.90 ± .04	2.01 ± .03	1.93 ± .07	1.93 ± .06
HEART	.87 ± .06	.93 ± .05	.78 ± .02	.80 ± .10
LIVER	8.82 ± .48	9.46 ± .38	8.50 ± .23	9.43 ± .42
SPLEEN	.51 ± .06	.51 ± .02	.56 ± .04	1.06 ± .09
KIDNEYS	1.75 ± .09	1.70 ± .08	1.71 ± .05	1.41 ± .04
BRAIN/BODY	8.28 ± .29	8.60 ± .14	8.78 ± .12	9.66 ± .21
HEART/BODY	3.80 ± .23	3.98 ± .18	3.59 ± .10	3.98 ± .37
LIVER/BODY	38.23 ± 1.27	40.40 ± 1.19	38.83 ± .79	47.09 ± .77
SPLEEN/BODY	2.20 ± .18	2.16 ± .09	2.56 ± .16	5.26 ± .33
KIDNEYS/BODY	7.59 ± .25	7.27 ± .36	7.79 ± .12	7.08 ± .32
HEART/BRAIN	.46 ± .03	.46 ± .02	.41 ± .01	.41 ± .04
LIVER/BRAIN	4.65 ± .26	4.71 ± .20	4.43 ± .10	4.88 ± .15
SPLEEN/BRAIN	.27 ± .03	.25 ± .01	.29 ± .02	.54 ± .03
KIDNEYS/BRAIN	.92 ± .05	.84 ± .04	.89 ± .02	.73 ± .03

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-33

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS	
		.001 % IN DIET	.01 % IN DIET
RBC (X 10 ⁶)	7.34 ± .28	7.15 ± .04	7.02 ± .24
HGB (G %)	15.12 ± .31	14.62 ± .09	14.28 ± .33
HCT (%)	40.40 ± 1.21	39.25 ± .85	39.60 ± 2.11
MCV (U)3	56.20 ± .73	55.75 ± .95	56.40 ± 1.47
MCH (UUG)	20.80 ± .49	20.00 ± 0.00	20.40 ± .40
MCHC (%)	37.20 ± .37	37.75 ± .48	36.00 ± 1.58
WBC (X 10 ³)	10.80 ± .86	9.82 ± 1.01	9.46 ± .87
PMN (%)	15.60 ± 1.21	20.75 ± 5.56	16.00 ± 1.41
BANDS (%)	0.00 ± 0.00	.25 ± .25	0.00 ± 0.00
LYMPH (%)	76.40 ± 2.11	73.50 ± 5.85	76.60 ± 1.89
ATYP LYMPH(X)	4.00 ± 1.14	1.25 ± .75	4.00 ± .55
MONO (%)	3.40 ± .51	3.50 ± .29	2.80 ± .20
EOSIN (%)	.60 ± .24	.75 ± .48	.60 ± .24
PLASO (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
RETICS (%)	.62 ± .17	.75 ± .17	1.30 ± .44
			17.50 ± 1.04

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-34

EFFECTS OF CONDENSATE WATER ON NEPHATOLOGY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 % IN DIET	.01 % IN DIET	.1 % IN DIET
RBC (X 10 ⁶)	7.05 ± .08	7.16 ± .12	6.39 ± .18	5.37 ± .13
HGB (G %)	14.78 ± .14	15.00 ± .05	13.78 ± .28	12.94 ± .27
HCT (%)	37.80 ± .58	38.40 ± .60	34.20 ± .80	32.20 ± .37
MCV (U) ³	54.20 ± .49	53.60 ± .51	54.40 ± .60	60.40 ± .40
MCH (UDC)	20.80 ± .37	20.60 ± .40	21.00 ± .45	24.40 ± .24
MCHC (%)	38.00 ± .32	38.20 ± .49	38.80 ± .20	40.20 ± .80
WBC (X 10 ³)	10.40 ± .98	10.56 ± .80	11.14 ± 1.29	15.04 ± 1.45
PHN (%)	14.80 ± .86	13.60 ± .98	15.00 ± 1.00	20.00 ± 2.26
BANDS (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	.40 ± .24
LYMPH (%)	74.60 ± 1.60	79.20 ± 1.02	80.80 ± 1.16	72.60 ± 3.20
ATYP LYMPH(%)	5.20 ± .86	3.20 ± .49	1.20 ± .58	2.80 ± .86
MONO (%)	4.20 ± .20	3.60 ± .24	2.60 ± .24	3.60 ± .24
EOSIN (%)	1.20 ± .20	.40 ± .24	.40 ± .24	.60 ± .24
BAZO (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
RETICS (%)	.86 ± .10	.80 ± .14	1.04 ± .14	17.60 ± 1.77

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-35
EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF MALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 Z IN DIET	.01 Z IN DIET	.1 Z IN DIET
ALBUMIN (MG%)	5.58 ± .10	6.00 ± .08	5.20 ± .08	5.20 ± .06
ALK-P (IU/L)	291.00 ± 30.2	282.20 ± 37.2	263.00 ± 39.2	220.60 ± 28.5
BUN (MG %)	24.00 ± .55	24.80 ± 1.36	22.60 ± 1.03	25.00 ± 1.30
CA (MG %)	10.04 ± .09	10.06 ± .19	9.46 ± .13	9.26 ± .15
CHOL (MG %)	32.00 ± .84	35.80 ± 3.20	38.60 ± 4.81	46.80 ± 3.41
CREAT (MG %)	.68 ± .02	.70 ± 0.00	.68 ± .04	.58 ± .04
GLUCOSE (MG%)	172.00 ± 7.25	159.80 ± 5.99	160.60 ± 5.69	148.20 ± 7.10
P (MG %)	9.12 ± .29	9.58 ± .54	10.68 ± .18	11.84 ± .31
LDH (IU/L)	880.20 ± 31.9	727.40 ± 149.	760.80 ± 158.	887.00 ± 216.
TRIG (MG %)	24.20 ± 1.02	25.80 ± 1.46	24.80 ± 3.12	20.40 ± 1.57
URIC ACID(MG%)	1.34 ± .12	1.16 ± .18	1.60 ± .19	1.58 ± .09
PROTEIN (MG%)	6.92 ± .07	7.34 ± .13	6.98 ± .19	7.14 ± .14
SCPT (IU/L)	34.80 ± 1.43	49.20 ± 9.42	36.60 ± 2.87	46.60 ± 14.1
SCOT (IU/L)	116.80 ± 3.48	145.60 ± 21.9	120.20 ± 6.93	128.80 ± 34.7
BILI (MG %)	.32 ± .09	.42 ± .10	.32 ± .04	.66 ± .13

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-36

EFFECTS OF CONDENSATE WATER ON CLINICAL CHEMISTRY
OF FEMALE RATS AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001 Z IN DIET	.01 Z IN DIET	.1 Z IN DIET
ALBUMIN (GMZ)	5.66 ± .16	5.46 ± .18	5.52 ± .09	5.20 ± .26
ALK-P (IU/L)	150.40 ± 19.9	209.00 ± 29.8	186.60 ± 12.2	151.60 ± 26.6
BUN (MG Z)	25.00 ± 1.45	25.20 ± 2.20	25.20 ± 1.28	25.60 ± 1.40
CA (MG Z)	10.28 ± .22	10.76 ± .30	10.46 ± .24	10.14 ± .25
CHOL (MG Z)	52.20 ± 3.84	56.80 ± 6.59	77.40 ± 18.2	54.60 ± 11.5
CREAT (MG Z)	.74 ± .02	.70 ± .05	.64 ± .05	.66 ± .02
GLUCOSE (MGZ)	179.60 ± 8.13	181.20 ± 15.5	158.00 ± 7.15	148.20 ± 6.97
P (MG Z)	8.86 ± .36	8.84 ± .49	8.92 ± .23	9.40 ± .47
LDH (IU/L)	869.60 ± 93.9	487.00 ± 141.	945.40 ± 63.6	497.40 ± 148.
TRIG (MG Z)	23.60 ± 2.01	26.40 ± 1.50	24.00 ± 1.05	21.40 ± .81
URIC ACID(MGZ)	1.62 ± .22	1.44 ± .10	1.74 ± .09	2.40 ± .35
PROTEIN (MGZ)	7.40 ± .22	7.34 ± .15	7.70 ± .21	7.26 ± .34
SGPT (IU/L)	54.20 ± 11.8	31.80 ± 3.40	32.20 ± 2.85	29.80 ± 1.77
SGOT (IU/L)	182.20 ± 20.3	121.00 ± 7.48	130.20 ± 8.51	87.80 ± 9.75
BILI (MG Z)	.41 ± .06	.44 ± .08	.33 ± .08	.46 ± .08

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-37

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
INITIAL	20.80± .37	18.60± .60	19.00± .89	20.20± .97
WEEK 1	21.60± 1.72	22.00± 1.10	21.20± 2.08	19.80± 1.83
WEEK 2	24.80± 1.74	23.40± .93	22.40± 1.94	22.00± 1.73
WEEK 3	27.40± 1.83	26.00± .71	27.80± 2.27	25.00± 1.73
WEEK 4	29.20± 1.96	25.40± 1.29	27.80± 2.15	26.00± 1.35

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-38

EFFECTS OF CONDENSATE WATER ON BODY WEIGHTS (G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
INITIAL	16.40± .40	18.60± .98	15.00± .55	16.20± 1.02
WEEK 1	19.00± .89	22.00± .89	18.60± 1.03	18.40± .93
WEEK 2	20.20± 1.16	25.20± 1.02	20.40± .60	18.40± .87
WEEK 3	23.00± 1.48	27.60± .87	24.20± .49	20.40± .93
WEEK 4	23.00± 1.10	26.60± .87	25.00± .45	20.80± 1.20

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-39

EFFECTS OF CONDENSED WATER ON FOOD CONSUMPTION
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
WEEK 1	3.57	3.83	3.86	3.03
WEEK 2	4.11	3.71	3.63	3.24
WEEK 3	4.46	3.49	4.34	3.64
WEEK 4	5.03	3.97	4.71	4.46

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-40

EFFECTS OF CONDENSATE WATER ON FOOD CONSUMPTION
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
WEEK 1	3.51	3.89	3.17	3.00
WEEK 2	3.54	4.60	3.69	3.49
WEEK 3	3.69	4.40	4.43	2.89
WEEK 4	4.14	4.54	4.69	3.54

UNITS ARE: GRAMS/ANIMAL/DAY

Table G-41

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
 ORGAN-TO-BODY WEIGHT RATIOS (1000XG/G) AND ORGAN-TO-BRAIN WEIGHT RATIOS (G/G)
 OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
BRAIN	.50± .02	.48± .03	.50± .02	.49± .01
HEART	.21± .02	.16± .01	.18± .02	.15± .01
LIVER	1.91± .16	1.51± .12	2.19± .13	1.93± .10
SPLEEN	.11± .01	.14± .01	.17± .03	.15± .01
KIDNEYS	.47± .05	.39± .04	.46± .03	.43± .01
TESTES	.23± .01	.21± .01	.16± .04	.11± .01
BRAIN/BODY	17.22± .82	19.05± 1.14	18.20± 1.19	18.88± .83
HEART/BODY	7.02± .73	6.17± .17	6.61± .31	5.91± .41
LIVER/BODY	65.37± 2.45	59.30± 2.31	79.39± 1.90	74.71± 3.95
SPLEEN/BODY	3.79± .26	5.51± .64	6.20± .71	5.82± .28
KIDNEYS/BODY	15.85± .68	15.34± 1.10	16.54± .44	16.64± .68
TESTES/BODY	7.97± .26	8.26± .56	5.84± 1.16	4.19± .65
HEART/BRAIN	.42± .03	.33± .02	.37± .02	.31± .02
LIVER/BRAIN	3.83± .21	3.15± .17	4.42± .24	3.97± .21
SPLEEN/BRAIN	.22± .02	.29± .02	.35± .06	.31± .03
KIDNEYS/BRAIN	.94± .08	.81± .04	.92± .05	.88± .01
TESTES/BRAIN	.47± .02	.44± .04	.32± .06	.22± .03

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-42

EFFECTS OF CONDENSATE WATER ON ORGAN WEIGHTS (G)
ORGAN-TO-BODY WEIGHTS RATIOS (1000XG/G) AND ORGAN-TO BRAIN WEIGHT RATIOS (G/G)
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.0012 IN DIET	.01% IN DIET	.1% IN DIET
BRAIN	.48± .02	.53± .01	.49± .01	.49± .02
HEART	.16± .02	.16± .01	.15± .01	.13± .00
LIVER	1.55± .14	1.67± .09	1.80± .07	1.57± .16
SPLEEN	.12± .01	.12± .01	.12± .01	.15± .03
KIDNEYS	.31± .02	.35± .02	.35± .02	.29± .03
BRAIN/BODY	20.85± 1.02	20.05± .47	19.76± .27	23.70± 1.13
HEART/BODY	6.73± .38	5.89± .32	6.00± .39	6.25± .43
LIVER/BODY	67.21± 3.74	62.77± 1.54	72.11± 3.85	74.54± 4.04
SPLEEN/BODY	5.28± .25	4.43± .38	4.66± .30	6.96± 1.15
KIDNEYS/BODY	13.43± .91	13.24± .62	13.98± .97	13.81± .83
HEART/BRAIN	.33± .03	.29± .02	.31± .02	.26± .02
LIVER/BRAIN	3.25± .22	3.14± .14	3.65± .21	3.20± .29
SPLEEN/BRAIN	.26± .02	.22± .02	.24± .02	.30± .06
KIDNEYS/BRAIN	.64± .03	.66± .03	.71± .05	.59± .05

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-43

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF MALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
WBC (X 10 ⁶)	7.73± .62	7.85± .23	7.22± .16	7.07± .26
HGB (G %)	13.80± .72	13.90± .58	12.63± .38	14.20± .51
HCT (%)	38.00± 2.65	37.25± 1.03	35.33± 1.76	35.25± 1.11
MCV (U)3	50.00± 1.00	48.75± .25	48.67± .33	50.00± 1.08
MCH (UUG)	18.00± .71	17.75± .48	17.67± .33	20.25± .25
MCHC (%)	36.75± 1.31	37.50± 1.04	36.00± 1.15	40.00± .58
WBC (X 10 ³)	12.25± .67	6.20± .74	7.49± 1.06	8.84± 1.86
PHN (%)	31.75± 3.73	23.00± 3.00	22.67± 3.28	25.00± 2.27
BANDS (%)	0.00± 0.00	0.00± 0.00	.33± .33	0.00± 0.00
LYMPH (%)	60.00± 2.94	67.75± 2.66	69.33± 4.81	67.75± 1.93
ATYP LYMPH (%)	2.75± .25	4.50± .96	2.33± .33	2.25± .63
MONO (%)	4.00± .41	4.00± .41	4.00± .58	3.50± .29
EOSIN (%)	1.50± .50	.75± .25	1.33± .33	1.50± .50
PLAS (%)	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00
RETICS (%)	.18± .05	.43± .11	.47± .09	1.50± .43

ENTRIES ARE MEANS AND STANDARD ERRORS

Table G-44

EFFECTS OF CONDENSATE WATER ON HEMATOLOGY
OF FEMALE MICE AFTER 4 WEEKS OF TREATMENT

DEPENDENT VARIABLE	CONTROL GROUP	TREATMENT GROUPS		
		.001% IN DIET	.01% IN DIET	.1% IN DIET
RBC (X 10 ⁶)	7.50± .20	7.94± .18	7.80± .07	6.93± .40
HGB (G %)	13.80± .20	14.22± .25	14.13± .38	13.60± .55
HCT (%)	36.50± .50	39.80± .80	38.33± .33	34.50± 1.19
MCV (U)3	50.00± 1.00	50.80± .37	50.00± 0.00	50.25± .85
MCH (UUG)	18.50± .50	18.00± .32	18.33± .33	19.75± .25
MCHC (%)	38.50± .50	35.80± .58	37.33± .33	38.75± .25
WBC (X 10 ³)	7.30± .70	6.42± .66	7.50± .06	11.64± 1.41
PMN (%)	27.00± 2.00	20.80± 1.36	16.67± .88	18.75± 2.29
BANDS (%)	0.00± 0.00	0.00± 0.00	0.00± 0.00	.25± .25
LYMPH	67.00± 3.00	71.60± 1.83	72.67± 1.33	73.25± 1.97
ATYP LYMPH (%)	1.50± .50	2.80± .37	4.67± 1.76	3.00± .91
MONO (%)	4.50± .50	3.60± .24	3.33± .33	2.75± .25
EOSIN (%)	0.00± 0.00	1.20± .49	2.67± .67	2.00± .41
BASO (%)	0.00± 0.00	0.00± 0.00	0.00± 0.00	0.00± 0.00
RETICS (%)	.15± .05	.14± .02	.50± .17	3.02± .44

ENTRIES ARE MEANS AND STANDARD ERRORS

Appendix H
CLINICAL CHEMISTRY CONTROL TESTS

Normal and abnormal control standards for hematology and clinical chemistry determinations, supplied by Coulter Electronics and Smith Kline Instruments, Co. for the GEMSAEC apparatus, were conducted each day that animal sera were analyzed in the SRI Clinical Chemistry Laboratory. The test results during 1978 covering the period when the present mammalian studies were run are compiled in the following tables.

Table H-1

PRECISION OF HEMATOLOGY DETERMINATIONS*

Dependent Variable	Normal Control		Abnormal Control	
	Standard [†]	SRI Test Results	Standard [†]	SRI Test Results
RBC ($\times 10^6$)	5.10 \pm 0.17	5.02- 5.26	3.18 \pm 0.13	2.85- 3.29
WBC ($\times 10^3$)	8.9 \pm 0.6	8.0 - 9.06	19.0 \pm 0.8	17.9 -20.0
Hgb (gm%)	14.9 \pm 0.4	15.1 -16.0	8.1 \pm 0.3	7.3 - 8.8
Hct (%)	42.8 \pm 2.0	42 -50	22.6 \pm 2.0	20 -25
MCV (μ^3)	84.0 \pm 3.0	83 -88	71 \pm 3.0	71 -79

* SRI Clinical Chemistry Laboratory, 4/78-12/78.

[†] Mean plus standard error.

Table H-2

PRECISION OF CLINICAL CHEMISTRY DETERMINATIONS*

Dependent Variable	Normal Control		Abnormal Control	
	Standard [†]	SRI Test Results	Standard [†]	SRI Test Results
Glucose	100 - 120	100 - 110	232 - 276	254 - 268
BUN	14 - 18	17 - 19	38 - 47	39 - 45
Creatinine	0.7- 1.1	0.8- 1.1	6.3- 7.2	6.4- 7.2
Phosphorus	3.2- 4.0	3.8- 4.0	8.8- 10.2	9.3- 10.2
Triglycerides	80 - 120	87 - 110	222 - 262	250 - 265
Bilirubin	0.8- 1.2	0.8- 1.0	4.6- 6.1	4.9- 6.0
SGOT	12 - 20	12 - 20	120 - 152	120 - 155
SGPT	11 - 19	12 - 16	102 - 132	103 - 119
LDH	42 - 60	53 - 60	217 - 287	239 - 280
Alk P	41 - 65	40 - 64	125 - 165	145 - 165
Cholesterol	129 - 159	125 - 159	250 - 311	240 - 275
Ca ²⁺	8.7- 9.5	8.8- 9.6	11.0- 12.0	10.4- 11.8
Uric Acid	4.6- 5.4	4.8- 5.9	9.6- 11.0	9.5- 11.7
Protein Total	5.7- 6.3	6.0- 6.4	4.9- 5.5	4.0- 5.3
Albumin	3.6- 4.2	3.9- 4.3	2.8- 3.6	3.1- 4.0

* SRI Clinical Chemistry Laboratory, 4/78-12/78.

[†] Acceptable range.

Appendix I

GAS CHROMATOGRAM OF
CONDENSATE WATER COMPONENTS

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